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INTERNATIONAL RAILWAY CONGRESS ASSOCIATION.

INQUIRY INTO QUESTIONS OF GENERAL INTEREST.

(Decision taken by the Permanent Commission at its Meeting held on July 9th, 1938.)

QUESTION I

Methods used to speed up passenger trains and the resulting expenditure.
In particular, operating by means of railcars
and the financial results obtained by this method.

SPECIAL REPORT

by L. DUMAS,

Directeur attaché à la Direction générale, French National Railways Company.

The object of the present report is to put before the International Railway Congress Association general summaries on the question of speeding up the passenger services.

Three reports have been presented :

— Report by Messrs. T. W. ROYLE and F. E. HARRISSON (Great Britain, India, Dominions and Colonies, North and South America, China and Japan);

— Report by Messrs. ROHDE, STRÖBE and FESSER (Germany, Bulgaria, Denmark, Hungary, Norway, Sweden and Switzerland);

— Our own report (Belgium and Colony, France and Colonies, Greece, Italy, Luxembourg, Holland and Colonies, Rumania. Jugoslavia).

The general summaries, which specially apply to European Railways, are as follows :

Summary I.

The greatly increased speed of the passenger services during the last five years in most countries is the result of competition from other methods of transport and the general desire for faster travel, both on the main lines and the secondary lines.

For the European Railways taken as a whole, during the last five years, the daily mileage covered at overall speeds of more than 96 km. (60 miles) an hour between two consecutive stops has in-

creased more than fourfold [69 909 km. (43 440 miles) in July, 1938, compared with about 14 557 km. (9 045 miles) in January, 1934].

The table below gives the details of the daily European mileage worked at more than 60 miles an hour overall speed between two consecutive stops in January, 1934, and July, 1938, and shows that such mileage has been more than quadrupled during that period.

—	1st January, 1934.		1st July, 1938.	
	Km.	Miles.	Km.	Miles.
Germany . . .	1 800	1 119	14 360	8 923
Great Britain .	4 170	2 591	18 220	11 322
Belgium . . .	...	...	2 299	1 428
Denmark . . .	...	...	1 369	851
France . . .	8 587	5 336	24 490	15 217
Holland . . .	...	...	5 435	3 377
Italy . . .	...	...	3 492	2 170
Switzerland .	...	...	244	152
Total.	14 557	9 046	39 909	23 440

The mileage worked at more than 60 miles an hour is :

— 4.55 % of the total passenger train mileage in Holland;

— 3.15 % in France;

— 2 % in Denmark;

— 1.3 % in England and Belgium, and

— 1 % in Italy and Germany.

The maximum speeds have been greatly increased during recent years, and are now :

— 160 km. (100 miles) an hour in Germany — in the case of the high-speed triple railcars (Schnelltriebwagen) on many lines — and in Italy (for the triple electric motor coaches known as « Electrotrains » on the Rome-Naples line);

— 145 km. (90 miles) an hour in England for the steam trains of the L. M. S. R. and L. N. E. R.;

— 140 km. (87 miles) an hour in Belgium, France and Holland for the high-speed railcars, etc.

The record overall speed of the F. D. t. 16 Schnelltriebwagen service is 132.3 km. (82.2 miles) an hour between the two stops at Hannover and Hamm which are 176.4 km. (109.6 miles) apart.

The European services worked at more than 60 miles an hour are divided up amongst the different methods of traction as follows :

—	Steam traction.		Electric traction.		Railcars.	
	Km.	Miles.	Km.	Miles.	Km.	Miles.
Germany	6 000	3 728	500	311	7 860	4 884
Great Britain	18 220	11 322	...	...	...	...
Belgium	1 965	1 221	...	...	334	208
Denmark . . . . .	...	...	...	...	1 369	851
France	11 123	6 912	3 840	2 386	9 527	5 920
Holland . . . . .	...	...	2 985	1 855	2 450	1 522
Italy	330	205	1 036	644	2 126	1 321
Switzerland . . . . .	...	...	244	152	...	...
Total	37 638	23 388	8 605	5 348	23 666	14 706

On the other hand, according to the « Institute of Transport », the mileage covered at speeds exceeding 112 km. (70 miles) an hour (all countries including the U. S. A.) is divided up as follows between the different methods of traction :

	Steam traction.	Electric traction.	Diesel locom., or railcars.	Total.
Germany { km. miles.	570 354	... ...	4 300 2 672	4 870 3 026
Great Britain { km. miles.	1 168 726	... ...	... ...	1 168 726
U. S. A. { km. miles.	1 536 954	290 180	5 237 3 254	7 063 4 388
France { km. miles.	112 70	210 130	2 848 1 770	3 170 1 970
Total. { km. miles.	3 386 2 104	500 310	12 385 7 696	16 271 10 110

This table shows that three quarters of the mileage covered at an overall speed of 70 miles an hour is worked by railcars or diesel locomotives.

Finally, according to the same source, the mileage covered at a commercial speed exceeding 120 km. (75 miles) an hour is worked exclusively by diesel railcars or diesel trains [Germany, 2 040 km. (1 268 miles) — U. S. A., 1 620 km. (1 007 miles) — France, 125 km. (78 miles)].

Summary II.

The speeding up of the passenger services on a great number of lines has been the result of a radical change in the traction conditions : electrification, or use of railcars.

As a matter of fact, electric motor coaches and railcars, thanks to their light weight and high proportion of driving wheels, are particularly capable of rapid acceleration and retardation, and high speeds.

The following table shows the length of the *electrified lines* of the European Railways on the 1st January, 1934, and 1st July, 1938, as well as the present percentage of electrified lines compared with the total length of lines in operation.

This table shows the great effort made to extend the electrification during the last five years in Italy (2 347 km. = 1 458 miles of lines electrified), and in France (1 180 km. = 783 miles). Taking the European Railways as a whole, the total length of electrified lines has been increased by nearly one half.

At the present time 73.8 % of the Swiss lines are electrified, 42 % of the Swedish lines, 28 % of the Italian lines, and 15 % of the Dutch lines.

The Companies have appreciably speeded up their passenger services on the electrified lines by the use of multiple-unit motor coaches [Germany, England, Belgium, United States (Pennsylvania R. R.), France (Paris-Le Mans), Holland, Italy, Switzerland, etc.].

—		Electrified lines.		Difference (lines elec- trified from 1934 to 1938).	% of elec- trified lines in relation to the whole of the lines worked.
		At 1st January 1934.	At 1st July 1938.		
<i>Germany</i>	km.	2 915	3 163	+ 248	5 %
	miles.	1 811	1 965	154	
<i>Great Britain</i>	km.	872	1 580	708	5.3 %
	miles.	542	982	440	
<i>Belgium</i>	km.	...	44	44	0.9 %
	miles.	...	27	27	
<i>Denmark</i>	km.	...	38	38	1.6 %
	miles.	...	24	24	
<i>France</i>	km.	2 175	3 355	1 180	7.8 %
	miles.	1 352	2 085	733	
<i>Hungary</i>	km.	156	248	92	3.3 %
	miles.	97	154	57	
<i>Holland</i>	km.	202	510	308	15.1 %
	miles.	126	317	191	
<i>Italy</i>	km.	2 453	4 800	2 347	28.2 %
	miles.	1 524	2 982	1 458	
<i>Norway</i>	km.	194	337	143	9.2 %
	miles.	120	209	89	
<i>Sweden</i>	km.	2 175	3 355	1 180	42.4 %
	miles.	1 352	2 085	733	
<i>Switzerland</i>	km.	2 058	2 124	66	73.8 %
	miles.	1 279	1 320	41	
Total.	km.	13 200	19 554	6 354	
	miles.	8 203	12 150	3 947	

The opposite table shows the *stock of railcars* owned by the various Managements in 1934 and 1938, as well as the percentage of the railcar mileage in 1938 compared with the total passenger mileage.

This table shows that the stock of railcars is four times as large in 1938 as in 1934, and that at the present time railcars work 41 % of the passenger train-miles in Denmark, 22 % in Italy, 22 % in Hungary, 18 % in France, etc.

The use of electric motor coaches and railcars makes possible the maximum acceleration, thanks to the high proportion of driven pairs of wheels; these units are also suitable for high maximum speeds, and are generally equipped with

—	Stock of railcars		Increase.	Percentage of railcar mileage in relation to the total pas- senger mileage.
	in 1934.	in 1938.		
<i>Germany</i>	172	524	352	7 %
<i>Belgium</i>	31	42	11	5 %
<i>France</i>	88	700	612	18 %
<i>Holland</i>	28	40	12	11 %
<i>Italy</i>	95	579	484	22 %
<i>Rumania</i>	31	207	176	...
<i>Denmark</i>	34	56	22	41 %
<i>Hungary</i>	62	213	151	22 %
Total.	541	2 361	1 820	

powerful brakes making the retardation effort proportional to the adhesion, and

even in certain cases independent of the adhesion (electro-magnetic brakes).

In practice the electric motor coaches and railcars make it possible to obtain definitely higher overall speeds than in the case of trains hauled by locomotives.

The following typical examples illustrate the performances of these units :

<i>Starting :</i>	
Altshom-Somua electric motor coaches (French National Rys. Co.) :	
Speed of 120 km. (75 miles) an hour	reached in 41"
Speed of 150 km. (93 miles) an hour	reached in 100"
Swiss Federal Rys.' electric motor coaches:	
Speed of 120 km. (75 miles) an hour	reached in 60"
Speed of 150 km. (93 miles) an hour	reached in 100"
Dutch diesel-electric sets :	
Speed of 120 km. (75 miles) an hour	reached in 90"
<i>Maximum speed reached during trials :</i>	
Italian Electrotrains.	200 km.
German Schnelltriebwagen.	(125 miles) an hour.

Summary III.

Even when the traction conditions are not radically altered, it is possible to speed up the passenger trains considerably :

(1) *by making the locomotives work harder;*

(2) *by reducing the weight of the trains;*

(3) *by doing away with stops in certain stations, or shortening the stopping times.*

During recent years, many Companies have increased the thermodynamic efficiency of their locomotives and streamlined the locomotives intended for fast services.

In addition, the present state of technical knowledge makes it possible to lighten the construction of metal coaches very considerably.

We will deal in turn with :

(1) *Operating questions :*

(a) Elimination of useless stops;

(b) Reduction of stopping times in intermediate stations.

(2) *Traction questions :*

(c) Altering the existing locomotives in order to increase their power;

(d) Buying more powerful up-to-date locomotives.

(3) *Rolling stock questions :*

(e) The use of lighter passenger coaches;

(f) Improving the brakes on power units or hauled stock.

(a) The elimination of useless stops.

In Holland, 148 stations have been closed to all traffic on the lines served by triple railcars alone.

(b) Reduction of the stopping time in intermediate stations.

In the United States and England, special importance is attached to reducing the stopping time in intermediate stations.

The Pennsylvania R. R. reports that through coaches forwarded by several trains in turn have been discontinued in order to avoid having to shunt them in the junction stations.

In many cases the L. M. S. R. has given up adding a goods wagon to passenger trains.

The L. N. E. R. has reduced the number of times locomotives are changed en route.

(c) Increasing the power of existing locomotives.

In France several thousands of locomotives have undergone alterations, and had their power increased thereby, making them suitable for the speeded up services, both on the main lines and the secondary lines.

The alterations generally concerned the following points :

- improving the exhaust, which has made it possible to reduce the back pressure in the cylinders by $1/2$ to $1/3$;

- increasing the superheat temperature, generally from 300 to 400° C. (572 to 752° F.);

- increasing the section of the steam passages, generally by doubling them in order to reduce losses of pressure in the pipes and wiredrawing through the ports;

- streamlining.

Certain Managements, whilst recognising the value of streamlining new locomotives, do not think it advisable to streamline existing locomotives.

The streamlining of locomotives intended for high speeds makes it possible to attach an additional coach to the train, according to several Railways.

(d) The building of new powerful locomotives.

Amongst the Managements consulted, only the British Railways have built a large number of powerful steam locomotives for passenger trains during the last few years.

In France, with an eye on the future, about ten new designs of powerful steam locomotives of various types are being built, most of them intended for high speeds.

On the other hand, at the beginning of 1938, France put into service two 4 000-h.p. diesel locomotives which have each run some 150 000 km. (93 000 miles) to date and are a very interesting experiment.

In addition we wish to mention two new high-power electric locomotives : the German 8 000-h.p. locomotive and the Swiss 12 000-h.p. locomotive.

(e) Lightening passenger rolling stock.

On most of the Railways, after relatively heavy metal coaches had been built, it was found advisable to try

and make them both lighter and more comfortable.

In the United States the 1930 coaches weighed some 80 tons; those built in 1939 weigh only 45 to 50 tons.

In Germany the metal coaches which weighed 48 t. (47.2 Engl. tons) in 1934, and 39 t. (38.4 Engl. tons) in 1935, will only weigh 28 t. (27.6 Engl. tons) in 1939.

In France, mention must be made of the 40 streamlined coaches built by Messrs. « Entreprises Charentaises », and the new lightened suburban coaches put into service in 1937 by the Eastern Area, which weigh 31.5 t. (31 Engl. tons), i.e. a weight saving of 10 tons compared with the original coaches.

(f) Improving the brakes.

As it was not possible to alter the position of all the distant signals before running the speeded-up services, the Railways have been led to improve the brakes, in order to enable the trains to be stopped in the usual distances (i.e. generally 1 000 m. = 1 100 yards).

Many new types of brakes have been tested and subsequently adopted, most of them based on the use of high braking ratios at high speeds, ranging about 150 or 200, and even 250 in the United States.

Summary IV.

When the traffic is dense and there is a great difference between the speeds of the different classes of passenger and goods trains, the speeding up of the passenger trains reduces the output capacity of the line and considerably interferes with the other services. When the traffic is light, no difficulty is experienced.

Summary V.

Before speeding up their trains, the Railways have generally had to attend to their lines :

- by increasing the superelevation on curves;

- by improving particular points requiring speed restrictions;
- by examining the bridges;
- by correcting the level of the running road.

After the services have been speeded up, they must pay particular attention to the maintenance of the permanent way, especially as the modern light-weight rolling stock used so far has shown itself very sensitive to imperfections in the track.

The Reichsbahn has spent 106 million RM. during the last six years on making its permanent way more suitable for the running of high-speed trains.

Switzerland is now using 36 m. (118 ft. 1 1/4 in.) long rails, as are Italy and France (Algerian lines).

The L. M. S. R. and L. N. E. R. are also using welded rails 36.50 m. (120 ft.) long with the particular object of increasing the comfort for passengers.

Though certain Managements have not found it to be so, it would appear that permanent way maintenance costs increase slightly with the speed.

In Germany, for example, it is estimated that such costs have been increased by 20 % during the last few years on account of the accelerations.

The signalling has been improved in certain cases; in Germany and Switzerland automatic train control and train stop are resorted to; the L. N. E. R. is installing pre-distant signals, whilst the Pennsylvania R. R. on the contrary is doing away with them and increasing the distance between the signals.

Summary VI.

Whilst endeavouring to speed up the services, the Railways should bear in mind the importance of comfort; the passengers want faster, more frequent, and above all more comfortable services.

To assure the success of a new method of traction, by electric motor coach or

railcar, it is essential that the rolling stock used be faultless from the point of view of smooth running and the damping out of noise and vibration.

Summary VII.

In order to please their passengers, many Managements have been led to increase the number of services as well as to speed them up.

This tendency has encouraged the extension of electrification and railcars in recent years, seeing that with these two methods of traction, the additional train-mile is cheaper than with steam traction.

On electrified lines, it does not cost much to increase the number of trains, especially when electric sets are used which make it possible to adjust the number of seats to the traffic (solution adopted in England, Holland and Switzerland, for example).

On non-electrified lines, the railcar has made it possible to introduce additional services at low cost.

It should be noted that the four-wheeled railcar is now hardly ever used on standard-gauge lines for services run at more than 60 km. (37 1/2 miles) an hour.

Various Companies are now building goods motor vans, special trailers, and even a diesel-electric railcar also equipped with a pantograph enabling it to pick up current when running over electrified lines.

Summary VIII.

The use of single or double railcars has often given rise to serious difficulties for the Operating Department as regards meeting peak traffic in a satisfactory way, in particular on secondary lines.

The Managements using multiple-unit railcars, especially triple or quadruple railcars with 2nd and 3rd-class compartments (Holland, Denmark), or 2nd

class only (Germany), on the other hand find no difficulty in dealing with peak traffic by coupling their multiple-units together to form sets of 6 vehicles (Germany), 8 vehicles (Denmark) or even 12 vehicles (Holland), so that the capacity corresponds exactly to the traffic.

It is becoming more and more general to use single or double railcars which can be coupled together or haul trailers. It is now possible to couple up railcars with different types of drive, mechanical, electric or hydraulic (Germany).

Whereas many Railways are extending the use of railcars able to haul trailers (France, Germany) others are definitely against trailers (Italy, Belgium).

Summary IX.

Many Managements have been good enough to send us statements showing the comparative traction costs for railcars, steam trains, and electric trains or motor coaches.

Such statements, which take the amortisation charges of the motive power and rolling stock into account, make it possible to set forth the following conclusions :

(1) Apart from the capital expenditure on electrification, the cost per mile for an electric train is only about 70 % of that of a steam train of the same capacity.

(2) The cost per mile for a four-wheeled railcar is about 30 % of that for a 3 or 4-coach steam train on secondary lines.

(3) The cost per mile for a bogie railcar of light design without trailer, is about 60 % of that for the steam train on secondary lines.

(4) The cost per mile for a bogie railcar with a trailer is about 75 % of that for the steam train, on secondary lines.

(5) The cost per mile for a high-speed railcar is 50 to 100 % of that for a steam train of 4 bogie coaches for express services.

Generally speaking, the cost per seat available in a railcar is higher than that of the corresponding seat in a steam train.

In Holland, however, it has been found that the cost per seat available in the triplets, 2nd and 3rd-class, is only about 90 % of that for a seat in trains; three other Managements have reported similar findings in the case of other kinds of equipment.

Summary X.

The cost of the railcar-mile is relatively high on the one hand because of the maintenance costs, and on the other hand because of the amortisation charges.

Maintenance costs are considerably reduced when the Railways own a relatively large stock of railcars strictly standardised from the mechanical point of view.

The amortisation charges can be reduced when the railcars are so built as to have a long life and give a very high annual mileage.

Experience would seem to show that the amortisation of the modern railcars ought to be calculated on a period of at least 20 years, and an effective annual mileage of 87 000 (140 000 km.), corresponding to a daily mileage of 250 (400 km.) per railcar of the whole stock.

The annual mileages vary a great deal from one railway to another, according to the greater or smaller number of railcars not in regular working.

The percentage of railcars undergoing heavy repairs is usually about 20 %, and may even be as much as 30 % in the case of extra-fast railcars (Schnelltriebwagen).

The percentage of railcars in reserve varies from 5 to 30 % according to the

Railways; some Companies accept the risk of failure of a railcar, which is becoming more and more rare, whilst others prescribe a wide margin of safety.

Summary XI.

In the above investigation into the costs, the figures given only apply to the expenditure on traction, i.e. about 60 % of the total cost of the passenger services.

To complete this investigation, it would be necessary to put into figures the actual or possible effects of the different methods of traction on permanent way maintenance on the one hand, and on the operating as a whole, on the other hand.

As regards the operating for example, certain methods of traction should make it possible to obtain such economies as : reduction in the number of classes, simplification of the rates, tickets no longer issued in the stations, but by the train staff, etc.

It would also be necessary to estimate the additional receipts, with the different methods of traction, resulting from the higher train frequency or the speeding up of the services.

Finally, it would be necessary to estimate the advertising value of some of the speeded up services, which indirectly increase the railway receipts to an appreciable extent.

To sum up, it would be necessary to investigate not only the traction costs for one particular service, but the receipts and expenditure for a group of lines as a whole, taking into account the traffic lost to competitive methods of transport.

Summary XII.

The Reichsbahn has made a detailed study of the expenditure in terms of the

speed, and has been good enough to send us graphs showing the various factors of the total cost in terms of the speed ().*

Certain expenses increase with the speed (locomotive maintenance and fuel consumption, permanent way maintenance), whilst other items decrease (train staff expenses, amortisation charges, etc.); for this reason the total cost of the train-mile reaches a certain minimum for an average speed of 80 km. (50 miles) an hour in the case of express trains.

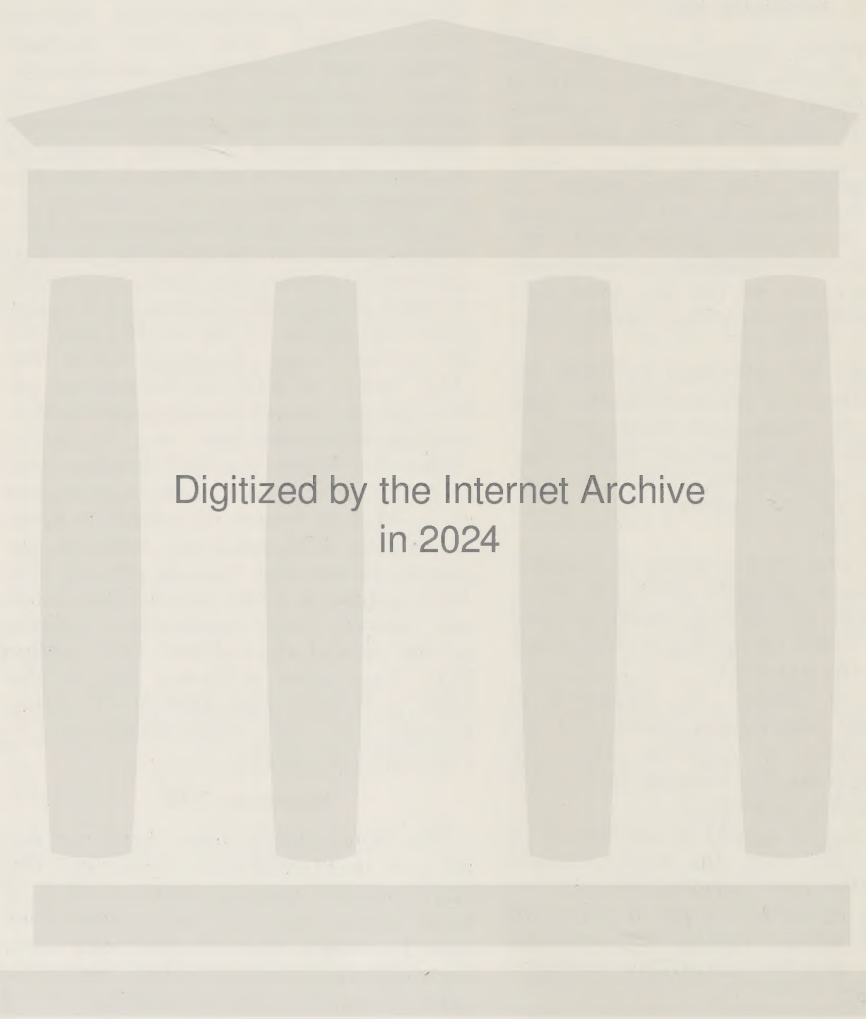
In this way the Reichsbahn has been able to prove that the speeding up of its passenger services has made it possible to make appreciable savings, quite apart from any effects on the traffic, and that the speeds now practised [73.4 km. (45.6 miles) an hour on the average for the express trains] could be further increased with advantage.

The Reichsbahn makes it clear that if its trains still ran at the same speed as in 1932, it would have had to spend 27 million RM. more in 1938 on the passenger services than it actually did. This is such a large amount that when the interest and amortisation charges on the capital expenditure (106 million RM.) have been deducted, the Reichsbahn is able to state that the financial balance sheet for train acceleration is definitely favourable.

Summary XIII.

The Managements who have speeded up and multiplied their passenger services, whilst assuring their comfort at high speeds, have in most cases been able to retain their traffic, and even been able to foster some new traffic, in spite of road or air competition.

(*) See Report by Messrs. ROHDE, STRÖBE and FESSER, *Bulletin of the Railway Congress*, June 1939, p. 555.



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INTERNATIONAL RAILWAY CONGRESS ASSOCIATION

INQUIRY INTO QUESTIONS OF GENERAL INTEREST

(Decision taken by the Permanent Commission at its Meeting held on July 9th, 1938.)

QUESTION II.

How should the problems of simplifying the working be considered, in the future, in the interest both of the public and of the railways?

SPECIAL REPORT

by E. DESORGHER,

Secrétaire technique à la Direction Générale de la Société Nationale des Chemins de fer belges.

One of the problems discussed at the Paris (1937) Session of the International Railway Congress Association was « the economical operation of the main line railways' secondary lines » (Question VII — Third Section).

The Permanent Commission of the Association considered that it would be a good thing to keep the railways informed about the development of this question, as well as the results obtained and the new methods introduced or proposed since the last Session of the Congress. In view of the frequent deficits shown by railway balance sheets, the Commission also thought it advisable to extend the investigation into simplified working to all lines of the Systems.

Three reports have been published :

— Report (Main-line railways of Continental Europe except Belgium), by Mr. GOURSAT ⁽¹⁾;

— Report (Secondary railways) by Dr. Gr. Off. Pietro LO BALBO ⁽²⁾;

⁽¹⁾ See *Bulletin of the Railway Congress*, June 1939.

⁽²⁾ See *Bulletin of the Railway Congress*, May 1939.

— Report (English speaking countries and Belgium) by E. DESORGHER ⁽³⁾.

The reporters collaborated in drawing up a questionnaire to be sent to the Managements concerned, according to the programme set by the Permanent Commission.

This questionnaire consisted of two parts : the first covering important and average lines, and the second the secondary lines. Only the second part was sent to the Managements of secondary railways.

The summaries of these three reports are given below :

I. General.

The Railways are still suffering from a serious financial situation as the result of :

1. Ill-regulated competition between methods of transport;

2. The obligations imposed on them, usually by statutory regulations dating

⁽³⁾ See *Bulletin of the Railway Congress*, April 1939.

back to a period when there was hardly any competition against the railway.

The urgent need for a sound co-ordination policy, giving each method of transport the traffic it has the best claim on in view of the advantages it can offer at a really lower cost, seems incontrovertible.

On the other hand it is the duty of the Railways to take every possible step to reduce their net costs, and consequently to introduce in every field of their activity such measures of economy as are compatible with their legal obligations.

II. General organisation measures.

Amongst such measures of economy are certain general steps, independent of the characteristics of the lines, for example :

1. Systematic revision of all the fixed plant in order to bring it in line with the strict requirements of the working and simplify the service of such plant.

2. Detailed study of the train working and shunting; permanent check on the extent to which passenger trains are used; increasing the paying load of goods trains; reducing the number of stops and shunting operations; concentration of all the train marshalling in a few large yards with up-to-date equipment, so that increased output can be obtained with reduced staff; use of trains hauled by light locotracors for serving small stations.

3. Rational organisation of the work at all the stations by careful study and timing of all the work; avoiding all loss of time; mechanisation of ticket issuing, handling operations, and marshalling yards; simplification of the clerical work and formalities with customers (direct communication by telephone, banking accounts, etc...); combining duties, especially in the small stations, so

that all the work can be covered by a smaller staff working to full capacity, the station premises being rearranged for this purpose, and being in addition more convenient for the public; use of temporary staff, or temporary transfer of men from one department to another (Locomotives and rolling stock, Operating, Permanent way) to meet traffic peaks; contracting out certain work to private firms (cleaning, heavy handling, etc...).

4. Reducing the duration of the service on the lines to the strict minimum.

5. Only opening small stations at certain hours of the day, as best suits the convenience of customers, who can, however, always obtain access to the loading and unloading platforms; clerical work for such stations taken over by a neighbouring managing station; replacement of the permanent staff at small stations with very little local traffic by caretakers, not on the permanent railway staff, but whose honesty can be relied upon and who will act as intermediary between the railway and its customers for a moderate compensation.

6. Organisation of road services, either operated by the railway itself, or by contract, or by agreement with private undertakings, for carrying passengers in small numbers, and bringing goods of all description to the railway.

Organisation of main-line railways.

III. Classification of the lines of a main-line Company.

Other measures of economy may be introduced on certain lines according to the amount of traffic carried. Most of the main-line Companies have grouped their lines according to the speed and traffic; such a classification has sometimes been ratified by the public authorities.

It includes :

1. The « main-lines », i. e. important and average lines whereon the operation still follows the classic principles, and

2. The « secondary lines » with little traffic, where simplified operation is generally in force.

IV. Organisation of the services on the main-lines.

The traffic over the main lines may be taken as consisting of two distinct kinds :

1. Traffic between important centres, worked over the line for relatively long distances;

2. Traffic to or from intermediate places, located at relatively short distances from the neighbouring large station.

In some cases this latter traffic is very light, and it is particularly affected by road competition. Certain Companies, as an experiment, have turned over this traffic to the road, either wholly or partly, as the road is often better able to cater for it, and in this way co-ordination can be obtained between rail and road transport.

Most of the Railways, however, still serve all the stations on their main lines by rail.

Characteristic measures of economy for such lines are :

1. The use (with adequate precautions to meet possible incapacitation of the driver) of electric traction, locomotives with internal combustion engines, and railcars, in order to reduce the staff in the locomotive running department and the expenditure on motive power.

2. Reduction of the train staff to the minimum number compatible with safety; systematic study of the roster for such staff; dispensing with train staff altogether, the engine driver or motor-man then carrying out the duties of the train men.

3. Operating lines with very dense traffic by the automatic block system, or by centralised traffic control (C. T. C.); bringing all the points and signals operating mechanism into a central signal box; putting certain boxes and manual or telephone blocks temporarily out of service at slack hours;

4. Protecting level crossings from a distance; dispensing with keepers at level crossings :

(a) Without any additional safety measures when the road traffic is small and the visibility good;

(b) With efficient automatic light signals when the traffic is relatively important;

(c) After building railway or road bridges when the road traffic is very heavy, the cost of such structures being fairly divided up between the different methods of transport concerned.

V. Organisation of the services on secondary lines.

Introducing simplified methods of operating often comes up against psychological difficulties; it seems to be very difficult to introduce a « secondary-line mentality » amongst the main-line railway staff. Consequently very careful training of such staff is essential. Some railways have got over this difficulty by handing over the operation of their secondary lines to local light railways.

Additional simplification measures applicable on secondary lines are :

1. The total or nearly total abolition of signals, using if need be fixed marker points which are not lit up at night; simplification of the working by having fixed places for trains to meet, the responsibility for such meetings resting with the train staff who are given very precise instructions. A single controller issues the necessary instructions by tele-

phone in any serious cases of late running.

2. When the proportion of secondary lines is sufficiently large to justify it, the use of special very light rolling stock : railcars, steam locomotives, loco-tractors, all designed to be driven by one man, who also has, as far as possible, to deal with the passenger service, issue and inspect tickets, and deal with parcels (one-man car);

3. Dispensing with keepers at level crossings, installing fixed road signs and imposing a speed restriction on the trains, requiring them to whistle to give warning of their approach; such speed restriction should not, however, lead to any appreciable falling off in the overall speed of the passenger trains; where keepers still have to be employed, they **should only be on duty** when trains are actually passing, provided proper precautions are taken if special trains are run.

4. Replacing the station staff by travelling staff who go by train from one station to another, and the employment of the usual train staff for certain station duties.

5. Discontinuing passenger railway services when the traffic is so small that it can be worked more economically by omnibus.

6. Complete abandonment of the railway services, and removing the whole railway equipment when there are other more advantageous methods of transport in existence or to be introduced, which are able to give the public about the same facilities as enjoyed with the railway.

VI. — Organisation of secondary railways.

In all countries the need for close

collaboration between the main-line and secondary railways has been recognised, the aim of such collaboration being to enable the secondary railways to reduce their burden to a reasonable extent.

The secondary railway lines may be classified into two groups.

1. Lines with both passenger and goods trains;

2. Lines with goods trains only.

The same simplification principles can be applied to both groups; they are mainly based on general organisation measures, and on those listed elsewhere for the main-line Companies' secondary lines. They also have a few special characteristics :

1. Handing over or contracting out certain services, such as : repairs to locomotives and rolling stock, station shunting, permanent way maintenance;

2. Use of standardised light-weight rolling stock, obtained by the use of high-tensile steels, light alloys, and welded tubular construction; extension of the use of fast services at frequent intervals, with petrol or diesel railcars, such railcars having a low centre of gravity to facilitate running through curves of small radius;

3. Introduction of lorry, motorbus and trolleybus services to supplement the railway services;

4. On certain lines substituting lorry, motorbus or trolleybus services for the railway service altogether, either run by the Company itself or by contract;

5. Introduction of combined (through) rates covering the various methods of transport worked by a given railway system.

Tickets,

by LIONEL WIENER,
Professor at the University of Brussels.

PART E (*).

TICKET REPRESENTATION OF TARIFFS. SPECIAL TICKETS.

CONTENTS.

GENERAL.

1. Tariffs.
2. Classes of travel.
3. Direction.
4. Zones.
5. Alternative routes.
6. Various kinds of trains.

CHAPTER XXIII.

FULL FARES.

General.

- A. Single tickets.
- B. Return tickets.
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CHAPTER XXIV.

REDUCED FARES.

General.

1. Reductions on the journey itself.
2. Reductions for professional reasons.
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CHAPTER XXV.

INCREASED FARES.

CHAPTER XXVI.

SUPPLEMENTS.

- (1) for comfort,
- (2) for speed,
- (3) for a particular route,
- (4) for extended availability,
- (5) rating,
- (6) various.

CHAPTER XXVII.

FREE TICKETS.

CHAPTER XXVIII.

OTHER TICKETS.

- A. Transport of animals.
- B. Luggage and goods.
- C. Tolls.
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- E. Various services.

APPENDIX.

CHAPTER XXIX.

ADDENDA.

Illustrations. — All the illustrations in Part E are 4/5 the original size in the case of Edmondson tickets, and 3/4 the size in the case of other tickets.

References to figures in other parts in *italics*.

(*) This article deals in detail with « Part E » of Mr. WIENER's serial on *Tickets* (See *Bulletin*, September 1938, page 893).

The previous articles, which were published in the March, May, July, September and November, 1938, numbers of the *Bulletin* have been reissued in book form and can be obtained from *The Railway Gazette*, 33, Tothill Street, Westminster S. W. 1.

French and German editions have also been published. For particulars apply to the Secretariat of the *International Railway Congress Association*, 231, rue Royale, Brussels.

GENERAL.

1. **Rating.** — All railway passenger rates must be represented by appropriate tickets. The latter will show the class of travel, the category to which they belong, the rate, and the fare charged.

METHODS OF DISTINGUISHING TICKETS. — To assist the staff and passengers, the different kinds of tickets can easily be distinguished from each other by one or several of the following devices :

The text;
Possibly the printing;
Sometimes also the shape;
The colour.

In England, and to a lesser extent elsewhere, many of the Railways show the category by a simple inscription, but they often overprint the ticket with a special letter corresponding to the category as ⁽¹⁾ :

C = Cheap;
H = Holiday;
D = Day excursion (fig. 884);
M = Monthly ticket.

Two-colour printing also helps to distinguish between categories. On the *Central Argentine* (fig. 295) all the text of Edmondson tickets is printed in black with the exception of the category which is printed in red. This avoids the use of many different coloured cards.

DISTANCES. — The ratio which exists between the distance and the price of the ticket makes it possible to infer the other factor when one is known ⁽²⁾. In this way it is possible to pay according to the mileage by means of tickets of a corresponding price, independently of the places served. This is the basis of the advance sales of kilometric and mileage booklet coupons with which the passenger pays instead of money (fig. 405).

On the other hand, whilst tickets usually bear the price for the distance over which they are valid, some of them also show the actual mileage. This is found on the Belgian, German and Hungarian multiple-destination tickets (fig. 195) and more rarely on certain tickets for fixed journeys (figs. 780-818).

Tickets for authorised changes of route are sold at a price corresponding to the difference between the mileage really travelled and that originally provided for.

It frequently happens that workmen's weekly tickets are based on a certain number of journeys over a given distance or else booklets containing workmen's coupons valid for a distance equal to a given sum, such as 1/2 d., are used (fig. 374). Ordinary tickets are issued in exchange, or sometimes tickets showing the number of monetary units for which they have been exchanged. For the more usual journeys, fixed-destination tickets are issued (fig. 773).

⁽¹⁾ This system has been developed to the greatest extent on the *Great Western Railway*. Some of the most usual abbreviations are given below :

SL = Soldier, seaman, etc., on leave;
ML = Mercantile marine on leave;
L = His Majesty's Forces on leave;
GR = Government rate;
O = Officer on leave;
TF = Territorial force.

⁽²⁾ The first Belgian tickets were drawn up in leagues, no mention being made of the places between which they were used (figs. 58-59).

As the tickets interpret the rates, they are sometimes affected by the actual, and sometimes by the virtual distance. It frequently happens that the real distances are increased in order to take into

ses or categories of tickets. In Switzerland and Germany, the rating distances for the transport of luggage often differ from that applying to passengers for the same journey; the tickets then show the two virtual distances (fig. 772).

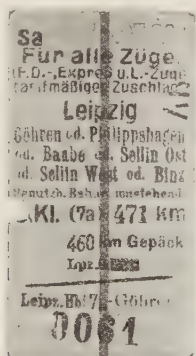


Fig. 772. — Ticket with different tariff distances for passengers and their luggage (Red. 4/5) — *Reichsbahn* — « Available on all trains » indicated by red vertical line — Alternative routes.

account some extra constructional or operating costs. It also happens, though more rarely, that the real length of the line is virtually reduced instead of increased as when the Company obtains some compensating advantage in exchange; the price of the tickets then refers to these special rating distances ⁽¹⁾.



Fig. 773. — Exchange mileage coupon ticket — *Aigle-Leysin Electric* (rack) *Ry.* (Red. 4/5).

It may also happen that different rating distances apply to the different clas-

SPECIAL RATES. — Tickets whose price is proportional to the scale of another tariff are used for certain rates. The *Société Genevoise de Navigation*, for example, issued fixed-value tickets for the transport of dogs or certain goods

for every journey « where the single fare exceeds ... frs. ».

Differential rates, such as those applied in Italy, do not involve any fundamental modification in the establishment of the tickets.

Certain Railways charge a uniform rate (figs. 87-438) whatever the distance covered; many Road Companies do the same at certain hours of the day, for example between 5 and 7.30 a.m. for the outward trip, and after 7.30 p.m. for the return.

In addition to the passenger rates whose number varies from one Company to another, other rates are also represented by special tickets :

TRANSPORT OF ANIMALS :

Dogs;
Other animals.

TRANSPORT OF PASSENGER VEHICLES :

Bicycles;
Motorcycles, motor cars;
Go- and mail-carts;
Perambulators.

CERTAIN KINDS OF GOODS ACCOMPANIED OR CONVEYED BY PASSENGERS :

Milk;
Fruit, etc.

(1) Cf. Article by the same author : « Tariff distances », which appeared in the *Railway Gazette*, 1st October, 1937.

We will deal with these tickets in Chapter XXVIII.

COLLECTIONS OF TICKET SPECIMENS. — The great number of different tickets has led certain Companies to issue collections of specimens, often printed in colour. We will mention some of them to show how the Companies have grouped their types of tickets.

The *Belgian State Railways* reproduced them in colour in the text of their bye-laws and regulations.

The *Hollandsche Spoorweg Maatschappij* published, in 1911, a volume of 202 pages containing 510 types in colour, grouped as shown in the footnote ⁽¹⁾. This was completed by annual illustrated supplements.

The *Belgian National Light Railways Co.* issued a series of 19 plates printed in black.

The 1926 edition of the French *Est Railways*' « Recueil de Spécimens de ti-

tres de circulation et de réduction » (collection of specimens of full- and reduced-fare tickets) included 182 types in colour, which were arranged in 7 main groups :

- I. Ordinary tickets.
- II. Tickets at reduced fares by reason of the conditions ruling certain special rates.
- III. Free transport or reduced rates in pursuance of concessions granted by the Company, tickets which are liable to the special tax introduced by the law of the 29th June, 1918 (modified by that of the 22nd March, 1924) ;
- IV. Similar transport not liable to this tax;
- V. Free transport.
- VI. Transport on account of Public bodies;
- VII. Military and naval.

The French « *Nord* » Railway published a set of plates reproducing 111 specimens in colour.

The *Reichsbahn* published a « *Fahrkarten-Mustersammlung* » on the 1st Oc-

(1) This Company is the only one that has printed all its tickets in colour on sheets which were afterwards cut up so that each ticket might be stuck in its proper place in the collection. The tickets were grouped as follows :

A. Edmondson tickets for local and through services.

Single — Return — Military — Supplement — Dogs — Special group tickets — For theatre or opera companies — For emigrants.

Various sorts of tickets issued by the « Controller » machines.

Steam tramways tickets — Ordinary tickets or tickets valid for 10 to 12 journeys.

Through services (both single, military and « Controller » machine tickets).

Through services with tramways other than the Company's.

Combined services with the *Smit and Co. Navigation Line's*. Through services with other Railways.

B. Booklets — 10 journeys — mileage — fixed journeys.

Combined booklets for through journeys over each of eight foreign Companies.

Combined booklets for trans-Netherlands journeys.

Booklets of « combinable coupons » — Booklets for travel agencies.

C. Other forms of tickets :

German type of blank ticket cards.

Mileage cards — Excursion cards — Circular tickets.

Season tickets — Party tickets.

Tickets for clubs, etc. — for scholars — Tickets issued against military warrants.

Various classes of free tickets — Countermarks — Free seasons and platform tickets.

Identity cards for post office staff — Supplements.

D. Sleeping car tickets — Tramway tickets.

An Addendum issued in May 1912 contained 94 additional reproductions of tickets; another issued in 1913, 19.

tober, 1927; a second edition appeared in April, 1929 ⁽¹⁾.

The *Rumanian Railways* published on the 1st December, 1935, a series of plates showing 206 types of tickets reproduced in colour. Addenda appear as required.

In the U. S. A., one of the first steps taken by the Government, when it took over the operation of the railways during the War, was to standardise the types of tickets in compliance with its circular No. P10. The collection of « Standard Forms of Tickets » showed 71 different types in black ⁽²⁾.

The *International Railway Transport Committee* has also published a « Collection of international types of tickets » which we will deal with in Chapter XXIII, Part C.

2. **Travel classes.** — There formerly were more classes than there are now. Thus the *British Great Western Railway*, used to have four classes, with variations :

Posting or saloon carriage;
1st class ordinary coaches;
2nd class in closed coaches (figs. 774 and 776b);
2nd class in open coaches;
3rd class, which, from 1840, were only available by goods trains.

The quality travelled in their own coaches, while the poorer classes had to put up with a great deal of discomfort. Legal steps were taken in 1841, and the « parliamentary fare » introduced ⁽³⁾; this has remained in force until the present time together with the ordinary 3rd-class fares, such 3rd-class passengers

(1) 150 reproductions in colour on 27 pages, grouped as follows :

I. Edmondson tickets (single, double, Sunday, workmen's).

Special tickets for parties and holidays — Military — Emigrants — Supplements for express trains — Extensions and changes of route — Members of recognised clubs, seat reservations, platform tickets.

II. Multiple tickets with control stubs.

III. Excursion booklets.

IV. Blank cards — Single cards for various categories of trains, workmen's cards, military cards, supplements for express trains, control, cash fare tickets sold on the train.

V. Season tickets either over fixed routes, regional or general.

VI. Bicycles.

VII. Various tickets from A. E. G. and Siemens machines.

Agency tickets, ordinary, express supplements, parties, members of the Reichstag, etc.

The addendum issued the 7th October, 1928, contained 51 additional types in colour.

(2) The tickets are grouped as follows :

Single and return Edmondson tickets.

White paper tickets, single, return, at 1/2 price and clergy.

Fare adjustment tickets issued in trains and stop-over tickets.

Exchange tickets issued on trains.

« Multi-journey » cards.

Booklets of « multi-journey » sheets or coupons.

Interline « band » tickets, single and return.

Single and return boat « band » tickets.

Booklets of « elementary-value » coupons.

Identity cards and tickets bought in advance.

Sleeping-car or saloon supplements; fare-adjustment supplements.

Luggage tickets.

(3) The Railways were required to run a train stopping at every station, at least once a day in each direction, at a minimum speed of 12 miles an hour. It had to carry sheltered 3rd-class carriages with sitting accommodation. The fare was to be 1 d. a mile.

In 1917, the « parliamentary fare » was increased to 1 1/2 d. per mile; it was again increased to 1 3/4 d. in 1920, and since reduced to 1 1/2 d. in 1923.

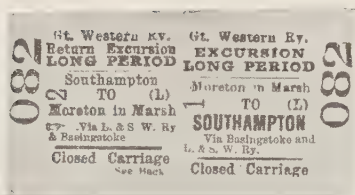


Fig. 774. — Horizontal return ticket for « covered carriage » (Red. 4/5) — *Great Western Ry.*, in the fifties — The two parts are numbered « 1 » and « 2 » — Category : Long-period excursion. Via a line belonging to another Company.



Fig. 775a. — Fourth-class « parliamentary fare » ticket — *North British Ry.* — Stamp dated (Red. 4/5).
By courtesy of the YORK MUSEUM.

being formerly excluded from the crack trains. There were even 4th-class « parliamentary » fares in Scotland (fig. 775a). The *Midland Ry.* was the first, in 1872, to make parliamentary tickets available on all trains which included « ordinary » 3rds, and since 1875 all the express trains without distinction included the latter. The other Companies followed suit rather grudgingly, and some of them maintained the wording « parlia-

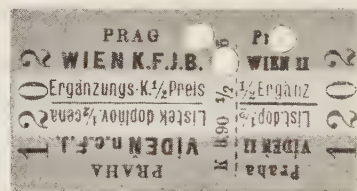
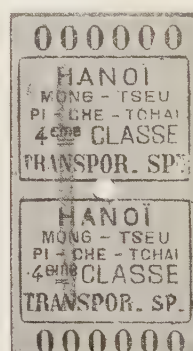
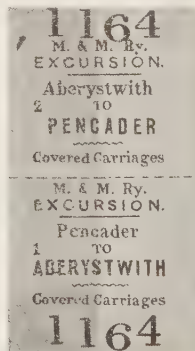
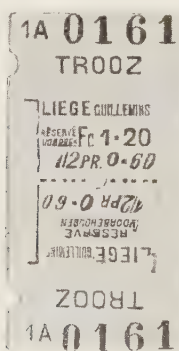


Fig. 775b. — Third-class bilingual ticket, with special tête-bêche arrangement of the text — *North-Western Ry. of Austria* — Could be used for half fare by detaching a stub (Red. 4/5).



Edmondson tickets for various classes (Red. 4/5).

Fig. 776a. — « Reserved » ticket, *Belgian State Rys.* — Could be used as full or half fare by detaching half — Vertically dated.

Fig. 776b. — Vertical return ticket for a journey by « covered carriage » (Red. 4/5) — *Manchester and Milford Ry.*, (in the fifties) — The two halves are numbered « 1 » and « 2 » — Category : excursion.

Fig. 777. — Vertical return 4th-class ticket in two parts (Red. 4/5) — *Incho-China and Yunnan Rys.* — Category : special transports.

mentary » on their tickets until quite recently ⁽¹⁾.

The *Furness Ry.* reintroduced « reserved thirds » in the eighties but the Government prohibited them. A similar attempt made later in Belgium (1895), to replace the abolished firsts by « reserveds » was not more successful (fig. 776a).

In the meantime, the number of different classes had been reduced. The *Midland Ry.* abolished its 2nds in 1875, in spite of the protests of the other Companies who soon found themselves obliged to do the same, so that only 1st and 3rd-class carriages remained ⁽²⁾. Except on the *Southern Ry.*'s and *London and North Eastern Ry.*'s boat trains, the last British 2nds disappeared on the 1st January, 1938 ⁽³⁾.

Fourth-class carriages were introduced in Germany on the 1st May, 1843, abolished on the 1st May 1853, re-esta-

blished on the 4th April 1864, and finally disappeared some ten years ago. They are still to be found in several foreign countries ⁽⁴⁾ (fig. 777).

Most European railways still run three classes of carriages, with a general tendency to eliminate the first, save on main line trains. The remaining classes are still called « 2nds » and « 3rds ».

In Russia also the number of classes has been reduced to two : there are compartments with « hard » and « soft » (upholstered) seats. This tendency to run fewer classes is extending; since the 1st January 1839, the *Tasmanian Govt. Rys.* only run a single class.

Although maintaining Pullmans comes to the same as retaining an extra class in America, many roads only have a single class. On those where two classes have been retained, the same interline paper « band tickets » serve indifferently for both. These are valid in 1st class unless

(1) Until 1922, these were the *Highland Ry.* in Scotland, the *Taff Vale Ry.*, *Cambrian Ry.*, « joint » and minor companies, in Wales; the *Midland and South Western Joint Ry.*, the *Stratford and Midland Joint*, the *Colne Valley Ry.*, the *Somerset and Dorset Ry.* in England, and the *Isle of Wight Ry.*

(2) English 2nd-class disappeared at approximately the following dates :

In 1875, on the *Midland Ry.*

Towards 1890 on the *North Eastern*, followed about 1893 by the *London Tilbury and Southend Ry.*

On the Scottish railways : *North British Ry.* and *Highland Ry.* in 1890, and *Caledonian Ry.* about 1893.

At the beginning of this century, the *Midland and South Western Joint Ry.* abolished it as did the *Mersey Ry.* in 1902, the *North Staffordshire Ry.* in 1906, the *District Ry.* in 1905, and the *Metropolitan* in 1906.

It disappeared gradually on the *Great Western Ry.*, and definitely by 1908.

On the *London and North Western Ry.*, the *Lancashire and Yorkshire Ry.*, and the *Cambrian Ry.* in 1911.

On the *London Brighton and South Coast Ry.* in 1913; on the *London and South Western Ry.* in 1916.

In Ireland, on the *Midland Great Western Ry.* in 1914; on the *Dublin South Eastern Ry.* in 1920.

After grouping in 1923, on all minor South Welsh railways;

on the *South Eastern and Chatham Ry.* (except boat trains);

on the *North London Ry.* except on inter-line trains;

on the *Glasgow and South Western Ry.*

In 1930 only on the *Great Southern Rys.* of Eire.

(3) These were the 2nds on the former *Great Eastern* and *Great Northern Rys.* suburban lines, as well as on through trains running via the *North London Ry.*'s line.

(4) In Indo-China; in the Belgian Congo (*Mayumbe Ry.*), and other colonial and overseas railways.

the special space marked « 2nd class » has been punched.

Overseas, some other classes such as the Indian « intermediate class », are to

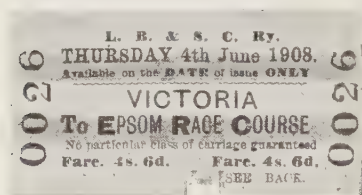


Fig. 778. — « No particular class of carriage guaranteed » (Red. 4/5) — *London, Brighton and South Coast Ry.* — Category: special race ticket — Outstanding initial letters of destination in heavy type — Printed date.

be found (fig. 779). In 1st-class coaches, special compartments are reserved for servants (servant ticket, fig. 780) ⁽¹⁾.

Many railways run special carriages for natives (figs. 781 and 782). The tickets bear the inscription « Indian » in North America, and « Natives » elsewhere (South Africa and Australia). There are also special tickets for coolies (fig. 783) and even for sending home sick coolies (*Deli Ry.*, Dutch East Indies).

We have not come across tickets « for sending room » except in India.

In order to distinguish the tickets applying to the different classes, the general practice is to print them on carton of a different colour for each class. The

whole ticket may be so coloured or there may be a coloured border or stripes or just a square of the class colour at the bottom of the ticket (*Est Ry.*, France).

In some cases, the letterpress is printed in the classes colour or a coloured band is overprinted on the ticket.

Other methods of distinguishing between the different classes of tickets have also been practised: they have been overprinted with a number of parallel lines ⁽²⁾, or with one, two or three diagonal lines close to one another for 1st, 2nd and 3rd class respectively; Edmondson tickets of the kind are reproduced in figs. 82 and 532. A similar method is used in South America but the lines are more widely spaced (fig. 943).

Other steps have to be taken, when one and the same ticket is valid in different classes on different stages of the journey. This applies in particular to a rail journey completed by water, light railway, tramway or bus.

In light railway trains and on board, the journey usually takes place in a higher class than on the main-line railways, and the ticket must show this ⁽³⁾. Edmondson tickets are, however, rarely coloured to correspond with the two classes used and are mostly of the colour used for the railway part of the journey. But this is not always the case, particularly in France. Single tickets are occasionally bicoloured in the colours applying to the

(1) In certain Colonies, the passenger's ticket is good for servants as well, whose number varies according to class. We will return to this point.

(2) *Belgian State Rys.*, about 1850 to 1860.

(3) Here are a few examples:

Tickets valid in:

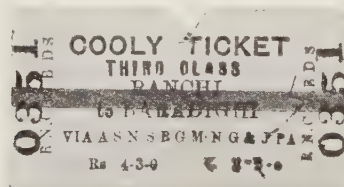
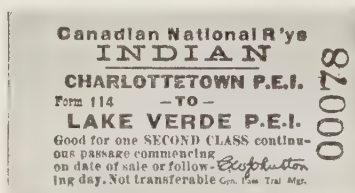
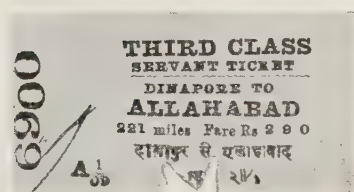
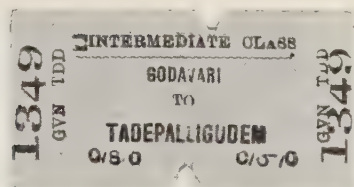
first class on the *Nancy Light Railways*, 2nd class on the *Alsace-Lorraine Railways*;

3rd class on the *Ouest* and 2nd class on the *Fougères-Rennes Tramway*;

3rd class on the *Paris-Orléans* and 2nd class on the *Charente Light Railways*;

2nd class on the *P. O.-Midi* and 1st class on the *Compagnie des Chemins de fer à voie étroite*.

Swiss tickets bear, for example, the inscription « 2nd class railway, 1st class boat ». whatever the Company issuing them (fig. 797).



Edmondson tickets for natives (Red. 4/5).

Fig. 779. — Intermediate class ticket, *Madras and Southern Mahratta Ry.* — In English only.

Fig. 780. — Servant's ticket — *East Indian Ry.* — Bilingual and giving the distance.

Fig. 781. — Bilingual ticket for natives (Red. 4/5) — *South African Rys.* — Surcharged with the initial letter of the category (N, native).

Fig. 782. — Indian's ticket (Red. 4/5) — *Canadian National Rys.* — Indicating the form — Signature of General Passenger Traffic Manager.

Fig. 783. — Inter-line 3rd-class cooly ticket — Issued by *Bengal Nagpur Ry.*

portion of the journey concerned. Fig. 784 is a curious example of a former through rail journey, in first in France and 2nd in Alsace.

Return tickets are coloured according to their category; thus the colouring of military tickets is diagonally divided. Fig. 785 also shows a peculiar ticket available in 2nd class on the outward and

in 3rd on the return trip, the ticket being coloured accordingly.

Finally, the two parts of through return tickets can each be coloured to correspond with the class colours. As the colours are reversed for the return run, this gives the ticket a chequered aspect (fig. 786) ⁽¹⁾.

European blank paper tickets can be

(1) Booklets with mixed class tickets are issued from Paris to London via Dunkirk-Tilbury, 2nd-class travel in France and 3rd class on the boat and in England, the cover being bicoloured vertically, green on the left and brown on the right.

bound in blocks of the respective class colours, but pads of paper coupons with the « grid » only in the colour of the class are more generally used (*fig. 280*). The class of travel is shown by writing the name of the destination station on the grid of the corresponding colour or, if all grids are black, of the corresponding class (*fig. 279*).

To avoid possible dispute, certain tickets are valid in the class for which they were bought or possibly in another.

On the *London, Brighton and South Coast Ry.*, for example, where on Derby Day the staff was always rushed by the crowds, the tickets mentioned the fact that

« no particular class of carriage could be guaranteed » (*fig. 779*).

Certain recent *London, Midland and Scottish Ry.* tickets are available for 2nd class, or for 3rd

« where no second- are available ».

A similar system is practised in France where certain compartments are common to both 1st and 2nd class.

3. The direction of the journey. — Edmondson fixed-journey tickets are not only used between pairs of places but also for the up and for the down journeys between these places.

They are distinguished from each other in various ways. In early times, when the staff was often illiterate and knew little about railway operation, certain Companies surcharged the back of the tickets with different emblems according to the direction; this enabled

the staff to grasp the direction at a glance without having to read the text. On the *Leeds and Manchester Ry.*, for instance, tickets for Manchester showed a fleece, those for Leeds, a bale of cotton, those for Bolton, a spindle, and so on, the cotton industry supplying all of them.

This complicated but very clear method soon gave way to simpler ones which were gradually extended to all lines. In England scales of standard colours were adopted for the different classes, one for the outward, and another for the return journeys.

In 1873, the *Great Western's*, 1st-class up tickets were white and down, yellow ⁽¹⁾; there were different ranges of colours for single and return tickets in internal and inter-railway traffic, not only for passengers but even for dogs! Return tickets combined the colours of the same class, in one order for the outward, and in the opposite order for the return journey ⁽²⁾.

It is essential for the staff and passengers on URBAN and SUBURBAN LINES with heavy traffic to be able to recognise the direction of travel very easily; this again is variously shown.

Tickets on the *Ceinture (Circle) Ry.* (Paris) were marked « odd and even trains », the former running in one direction, the latter in the other (*fig. 787*).

The *London District Ry.* marked its tickets, according to the direction, with a large « I » or « O » (« inner » and « outer circle », *figs. 163 and 164*); the

(1) On the *London and South Western Ry.*, the *Furness Ry.*, the *South Eastern Ry.* and the *Midland Ry.* (to quote only a few examples), 1st-class Edmondson tickets were yellow or purple according to direction, the 3rd-class, green or buff.

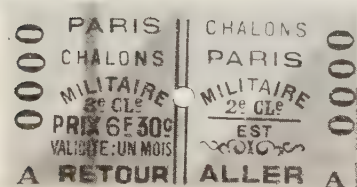
(2) The former *Great Eastern Ry.* tickets for example were, in one direction white, purple or green according to the class, and yellow, blue or buff in the other. The return tickets were bicoloured, with the « return » portion on the left; this was the only Company having this arrangement, all other returns being on the right.



in that the return portion bears the usual inscriptions while the outward coupon states :

In opposite direction from accompanying coupon (fig. 789).

« Combinable » booklet coupons and other paper tickets are frequently valid in both directions and the extremities of the journey are designated in each direc-



Two-coloured Edmondson return tickets for two different classes in succession — French Est Ry. (Red. 4/5).

Fig. 784. — 1st-class on the Est and 2nd on the Alsace-Lorraine.

Fig. 785. — 2nd-class on the outward and 3rd-class on the return journey — Category : military — Separate bicolouring on each portion.

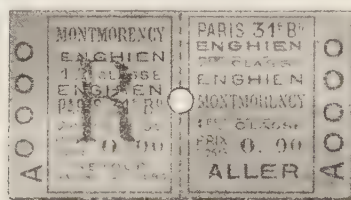
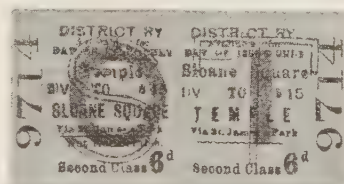
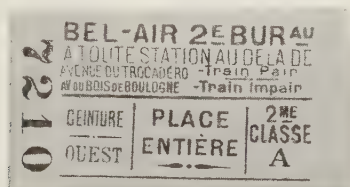


Fig. 786. — Inter-line return ticket for a main-line railway (Nord) and secondary railway (Enghien-Montmorency Ry.) — Each part with the colours for the two classes in the proper order — The letter R (Return) surcharged in red (Red. 4/5).



Edmondson tickets for urban lines showing the direction of the journey (Red. 4/5).

Fig. 787. — Ceinture-Ouest — Even and uneven numbering of trains — Names of the Companies in the lower left-hand corner.

Fig. 788. — London District Ry. — The red surcharged « I » and « O » indicate the direction for each half of the return ticket — The black skeleton letters are the initials of the destination stations.

return tickets bore both these letters, one on each half (fig. 788).

Tunis suburban tickets have a wide diagonal band, blue on down tickets, red on up ones.

Paper tickets have fewer indications. The Newfoundland Rys. are interesting

tion, the direction which is not being followed having to be cancelled (fig. 92).

ROAD TRANSPORT COMPANIES pay more attention to the direction of the journey. They sometimes use the same tickets in both directions, sometimes different ones.

Fig. 789. — *Newfoundland Ry.* blank return paper ticket (Red. 3/4) — The outward coupon is valid « in the opposite direction » to that of the return coupon where the route is given in full — Number of form.

USE OF THE SAME TICKET BOTH WAYS. —
The more usual methods are :

(a) Identical tickets which are cancelled with a red stroke in one direction, and a blue one in the other (1).

(b) Tickets are printed with the words « outward » and « return » or with their initials, or equivalents. In each case, to show the direction actually taken, one of these is cancelled by perforation, by severance or with a pencil (2) (fig. 790).

English soft card tickets are generally printed « in » and « out » (figs. 815-844), this being considered equivalent to « up » and « down » (fig. 791);

(c) The ticket is surcharged with two arrows (fig. 351), one for each direction (3) (card ticket fig. 472; paper ticket figs. 480c-792);

(d) Two lists of fare stages or section numbers are printed, one for each direction (figs. 174 and 205). These lists can be printed in the same or in reverse order, followed or not by the letters « A » or « R » (outward or return (4), or the second list be printed tête-bêche (fig. 791).

Fig. 790. — Paper ticket showing the direction (Red. 4/5) — *Tramways de Paris et du Département de la Seine* — The letter « A » or « R » is indicated according to the direction — Valid on 1st stage.

Fig. 791. — Soft cardboard ticket with the fare stages printed upright one way and the opposite in the second column — *London County Council Tramways* — With number of the line (506).

(1) Brussels.

(2) Paris, the *Paris and Seine Department Tramways*. The letters « A » and « R » are sometimes very ornate (Palermo).

(3) This process is often resorted to in Germany (Rostock, Dresden, Elberfeld). It was used on the first tickets of the *London General Omnibus Co.*

(4) At Sousse (Tunisia).

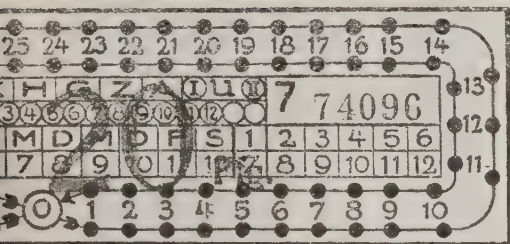
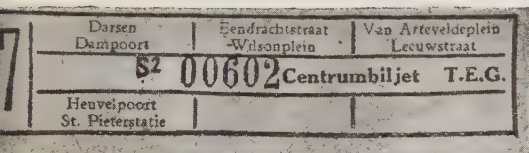
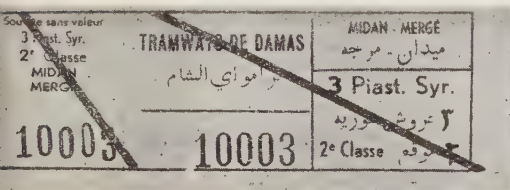


Fig. 792. — Paper ticket with arrows showing the direction (Red. 3/4) — The section numbers are to be punched on one or other arrow — Lists of line numbers, days and hours.



Paper tickets (Red. 3/4).

Fig. 793. — *Damascus Tramways* ticket on which the « return » direction is shown by a diagonal line repeated on the stub.

Fig. 794. — *Ghent Electric Tramways* « Centre » ticket — Large numeral of issuing line and list of other routes for which the ticket can be used.

One of the lists may be printed in negative type (fig. 346).

A further distinction can be made between the lists by hatching the part of the ticket on which one of them is printed (1).

(e) At Blackpool, the sections are numbered with even numbers on the upward and odd numbers on the downward run.

In order to avoid having to punch each of the end stages of the trip and the words « in » or « out », certain American tickets are printed with lists divided into two columns by a vertical line, or else the right side of the list of names is printed in different type to that used for the left.

In the same way, there are in Vienna two lists of the days of the month, the right or left-hand list being clipped according to the direction to be travelled (fig. 505).

USE OF DIFFERENT TICKETS EACH WAY.

(a) Differently coloured tickets;

(b) Tickets of the same colour for every value, one lot bearing the word « outward » and the other « return » (2);

(c) Tickets of the same colour, those for the second direction surcharged with special marks : a printed word (3), a diagonal line, (fig. 793), a coloured band (fig. 599), a star, etc.

4. Regions. — In addition to tickets available on the entire railway system, special tickets are issued in certain regions with heavy traffic served by urban or suburban lines.

The same practice is followed by urban road Transport. In London, Ghent, and Brussels, « centre » tickets, valid on all

(1) *Kenya Bus Service*.

(2) Those of the *Tacoma Ry. and Power Co.* have stubs with the words « inbound » and « outbound ».

(3) On the « *Compagnie des Chemins de fer à voie étroite* » the letters « A » or « R » appear, as the case may be, in one corner of the ticket.

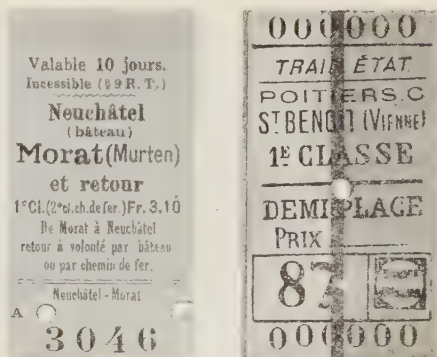


LIGNES	ARRÊTS
24: P. Sal. → P. Mar.	24: P. Sal. → P. Mar.
25: P. Sal. → P. Mar.	25: P. Sal. → P. Mar.
26: P. Sal. → P. Mar.	26: P. Sal. → P. Mar.
27: P. Sal. → P. Mar.	27: P. Sal. → P. Mar.
28: P. Sal. → P. Mar.	28: P. Sal. → P. Mar.
29: P. Sal. → P. Mar.	29: P. Sal. → P. Mar.
30: P. Sal. → P. Mar.	30: P. Sal. → P. Mar.
31: P. Sal. → P. Mar.	31: P. Sal. → P. Mar.
32: P. Sal. → P. Mar.	32: P. Sal. → P. Mar.
33: P. Sal. → P. Mar.	33: P. Sal. → P. Mar.
34: P. Sal. → P. Mar.	34: P. Sal. → P. Mar.
35: P. Sal. → P. Mar.	35: P. Sal. → P. Mar.
36: P. Sal. → P. Mar.	36: P. Sal. → P. Mar.
37: P. Sal. → P. Mar.	37: P. Sal. → P. Mar.
38: P. Sal. → P. Mar.	38: P. Sal. → P. Mar.
39: P. Sal. → P. Mar.	39: P. Sal. → P. Mar.
40: P. Sal. → P. Mar.	40: P. Sal. → P. Mar.
41: P. Sal. → P. Mar.	41: P. Sal. → P. Mar.
42: P. Sal. → P. Mar.	42: P. Sal. → P. Mar.
43: P. Sal. → P. Mar.	43: P. Sal. → P. Mar.
44: P. Sal. → P. Mar.	44: P. Sal. → P. Mar.
45: P. Sal. → P. Mar.	45: P. Sal. → P. Mar.
46: P. Sal. → P. Mar.	46: P. Sal. → P. Mar.
47: P. Sal. → P. Mar.	47: P. Sal. → P. Mar.
48: P. Sal. → P. Mar.	48: P. Sal. → P. Mar.
49: P. Sal. → P. Mar.	49: P. Sal. → P. Mar.
50: P. Sal. → P. Mar.	50: P. Sal. → P. Mar.
51: P. Sal. → P. Mar.	51: P. Sal. → P. Mar.
52: P. Sal. → P. Mar.	52: P. Sal. → P. Mar.
53: P. Sal. → P. Mar.	53: P. Sal. → P. Mar.
54: P. Sal. → P. Mar.	54: P. Sal. → P. Mar.
55: P. Sal. → P. Mar.	55: P. Sal. → P. Mar.
56: P. Sal. → P. Mar.	56: P. Sal. → P. Mar.
57: P. Sal. → P. Mar.	57: P. Sal. → P. Mar.
58: P. Sal. → P. Mar.	58: P. Sal. → P. Mar.
59: P. Sal. → P. Mar.	59: P. Sal. → P. Mar.
60: P. Sal. → P. Mar.	60: P. Sal. → P. Mar.

Figs. 795 and 796. — Brussels Tramways « Centre » ticket — On the back, list of the sections of all the lines for any one of which the ticket is available (Red. 3/4).

lines between certain points of each, are sold (figs. 794 to 796); in Paris, suburban and *extra muros* tickets were used.

Scheme and zone fare tickets come un-

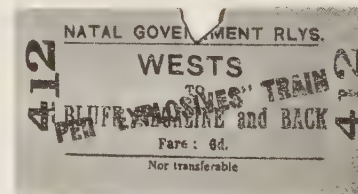
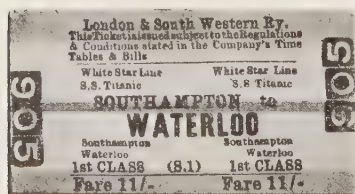
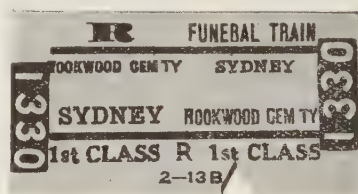
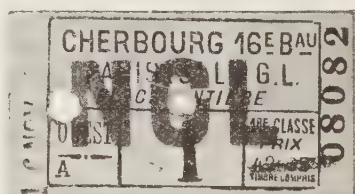


Edmondson tickets (Red. 4/5).

Fig. 797. — Combined ticket issued by the Neuchâtel and Morat Lakes Steam Navigation Co., 1st class on the boat or 2nd class by rail — The return journey can be made by either method of transport.

Fig. 798. — Ticket issued by the Paris-Orléans Ry. for State Ry. trains with running rights — Company's name in S. E. corner — Category : half fare.

der this heading. We have dealt with these elsewhere.



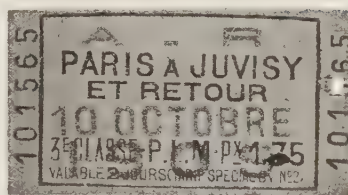
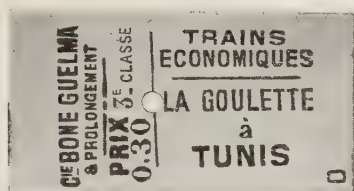
Edmondson tickets for special trains (Red. 4/5).

Fig. 799. — French Ouest Ry. — Ticket for the Nord-Deutscher Lloyd train.

Fig. 800. — Special London and South Western Ry. train for the White Star's « Titanic ».

Fig. 801. — Return ticket for funeral train, New South Wales Govt. Rys.

Fig. 802. — Return ticket available on explosives train — Natal Govt. Rys.



Edmondson tickets (Red. 4/5).

Fig. 803. — Ticket for light train — *Bône-Guelma and Extension Co.* — Part of the text printed either way.

Fig. 804. — Return ticket for special train, with date surcharged in red — *P. L. M. Ry. Co.*



Fig. 805. — Paper passenger ticket by goods train — *Highland Ry.* (Red. 3/4).

5. **Alternative routes.** — There is often a choice of alternative routes between two places. When the lines belong to the same Company, the fares are usually the same, and based on the lowest. *A fortiori* is this the case when they belong to competing Companies. Most tickets show the different authorised routes (fig. 797). Certain Companies go further and state, if need be, on their tickets, that the jour-

ney takes place by the usual route (fig. 915) or via a given place on the through line (fig. 76).

When the audit department requires to know which of the authorised routes was actually followed, Edmondson tickets with control stubs are provided (figs. 67-68) and the booklet paper coupons have stubs corresponding to the different routes concerned (fig. 91).

6. **Various trains.** — Tickets are not uniformly available on all trains and, special tickets are issued for some of them, besides supplements and extra-fare tickets. Apart from trains for which cheaper or higher fares are charged and which will be considered in the following pages, certain trains where the usual fares rule may only be boarded by passengers having appropriate tickets. For example, there is a complete range of boat train tickets, some of which are issued without any supplementary charge :

« Boat Express » of the Southern Ry. (with increased fare);

Transatlantic boat trains for passengers by various Companies' steamships (figs. 799-800) ⁽¹⁾.

There is a sad association in the latter ticket which was issued for the ill fated « Titanic ».

Other ordinary fare trains, such as the Australian (fig. 801) and the American funeral trains, are run on special occasions, the family buying the requisite number of ordinary tickets, but the funeral escorts increased in America to such proportions that these trains are no longer provided.

On lines with light traffic, passengers may be authorised to travel in trains which were not originally intended for them. Special tickets are issued in consequence, such as those for :

Goods trains (fig. 805);

« Explosives » trains (fig. 802).

Few of the latter are issued. With good reason.

CHAPTER XXIII.

FULL FARES.

General. — **MULTIPLE FARES TO THE SAME PLACES.** — For each class of travel, there may exist full fares, cheap fares and, sometimes, increased fares, which we will examine in turn. We will then consider supplementary fares enabling passengers to change over, on payment of a surtax, from one tariff to another, and deal briefly with free tickets to finish up.

Any fare in force necessitates the use of single and return tickets for each class. These may be for fixed journeys, for multiple destinations, or based on a zone tariff (figs. 194 to 199).

Tickets valid over several lines (through or inter-line services) and « transfers », will be dealt with separately.

A. SINGLE TICKETS.

The *Leeds and Selby Ry.* had tickets as early as September 1834, and the *Belgian State Rys.* and the *Ludwig Eisenbahn Ges.*, in Bavaria, in 1835 (figs. 10 and 259).

Figure 806 shows a paper ticket dated 1835, issued by the *Stockton and Darlington Ry.* which the holder had to give up to the « engineman » on leaving the train ⁽²⁾. Up to that time, the « road

⁽¹⁾ As the journeys are usually short, Edmondson tickets are used. This also applies to the Indian « Boat Mails ». Booklets of detachable coupons are, however, issued to passengers on the *Rotterdamsche Lloyd* trains, from the Hague through Brussels, to Marseilles.

⁽²⁾ It states on the back :

« This ticket, to be delivered to the Engine Man, expires with the date and is not transferable ».

It is a pleasant duty for us to thank Mr. E. M. BYWELL, Curator of the *York Railway Museum*, for this information, and for having enabled us to reproduce Figs. 807, 816, and early *Stockton and Darlington Ry.* and *Newcastle and Carlisle Ry.* tickets.

money » had been handed directly to the driver or conductor. As from the opening of the *Newcastle and Carlisle Ry.*, passengers paid in advance to the appointed station employees monies which were remitted by the latter to the train staff — still without any receipt or accounting.

There were as many counterfoil booklets of paper tickets as days in the month; each of them contained « approximately » one thousand tickets. As there were booklets for the end stations and each of the intermediate ones some 100 000 unnumbered tickets were on hand. The only check was obtained by occasionally counting the passengers to see if their number tallied with the number of tickets sold. Certain lines, such as the *London and Greenwich Ry.*, required patrons to pass through a turnstile; others used metal tickets (fig. 807). We have previously reported how these impractical travel receipts died out, their place being taken by Edmondson card tickets.

The text of single Edmondson tickets was often printed parallel to the long side (figs. 808 to 811). Except in Great Britain and overseas, it is now more usual to arrange it the other way.

Figs. 800 to 815 show different arrangements of single tickets based on various principles. Only those used in Iran are larger and those in Brazil, smaller than tickets of standard size. Figure 815 shows one of the smallest soft card tickets issued by a road transport company.

To save cardboard, the *London and South Western Ry.* introduced, in 1881, single tickets with detachable portions similar to their returns. The two parts were identical, even to their numbering (fig. 809). This innovation was held up

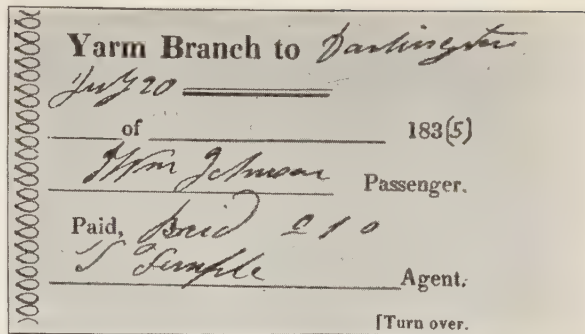


Fig. 806a. — One of the earliest single English paper tickets (1835) — Yarm branch of the *Stockton and Darlington Ry.* — Hand written date and fare — No serial number (Red. 3/4).



Metal tokens (full size).

Fig. 806b. — *Sheffield and Rotherham Ry.*

Fig. 807. — *Newcastle, North Shields and Tyne-mouth Ry.*

to ridicule, but it was again applied in England during the War as an economy measure, and is still occasionally resorted to ⁽¹⁾.

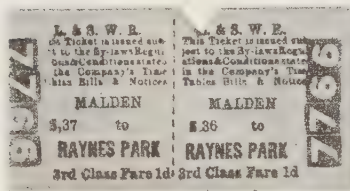
(1) *Liverpool Overhead Ry.*

B. RETURN TICKETS.

Return tickets give rise to a great many problems concerning :

- The period of validity;
- The systems used;
- The arrangement of the tickets;
- Through returns.

They go back to the stage coach whose owners wanted to make sure passengers

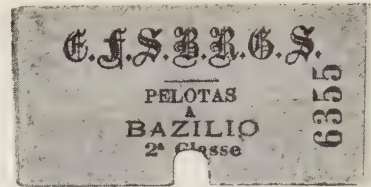


Single Edmondson tickets (Red. 4/5).
Fig. 808. — *London and North Western Ry.*
single ticket (in the fifties).

Nota. — Fig. 448 shows the back of the same ticket with ornate initials.

Fig. 809. — Double single ticket with two identical halves in the eighties — *London and South Western Ry.* — Same numbers on both parts — Different serial numbers.

would return in the same coaches. A reduction on the fare was granted to ticket holders who remained faithful to the Company. The paper return ticket shown in figure 816 is the oldest railway return we know of, and cost a shilling only ⁽¹⁾.



Single Edmondson tickets with very little text, and conspicuous Company's initials. (Red. 4/5).

Fig. 810. — *Estrada de Ferro Southern Brazilian Rio Grande do Sul* (1884) in gothic type.

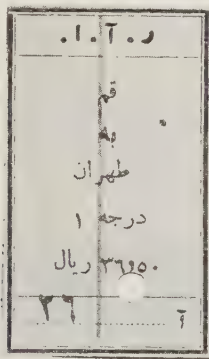
Fig. 811. — *Estrada de Ferro Porto Alegre a Tristeza* (End of last century).

When the railways enjoyed a monopoly, there was no object in granting a reduction for a return : it costs as much to carry a passenger 50 miles away and 50 miles back as 100 miles in one direction; in fact it may be said to cost more as he uses the starting and destination stations twice in the first case and once only in the second. The idea of granting cheaper fares to encourage people to travel is quite a different thing.

At the present time, other competitive methods of transport have been introduced, and the Companies, as in the past, have to fight against road and even air competition; cheaper fares are once more justified and especially for return journeys.

⁽¹⁾ We have also to thank Mr. E. M. BYWELL for this information. This figure as well as figures 806 and 807 and some of the information concerning these ancient tickets are reproduced from « *The North Eastern Railway* », by W. W. TOMLINSON.

These tickets are known by various names : « double trip » in Switzerland, « tour » and « retour » in Austria (*fig. 180*), « round trip check » in America; while in Brazil they are marked with capital letters « I » and « V », the initials of « Ida » and « Vuelta » (*fig. 819*).



Figs. 812 and 813. — Front and back of out-size cardboard tickets of the *Trans-Iranian Ry.* — Company's crest on the back. (Red. 4/5).

Certain English tickets are rather confusing. Though the expression « return » applies to the return half of the ticket, it is also used as a name for the whole ticket (*fig. 184*) as the counterpart of the word « single ».

THE PERIOD OF VALIDITY OF RETURN TICKETS is generally mentioned on the ticket, but it nevertheless gave rise, some thirty years ago, to a curious lawsuit

which had important consequences. Judgment was given that a return ticket issued in conformity with the laws and bye-laws and without any additional concession, remained valid indefinitely. As the Company was obliged by its original charter to sell such tickets, it could not withhold one of their advantages without offering some compensation; if the prospective passenger considered this sufficient he bought the ticket.

This ruling covers not only tickets whose period of validity is not mentioned, but also those on which it is specifically given; if the Company considers that it is impossible to keep a check

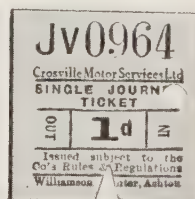
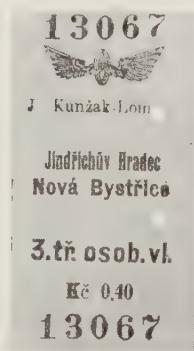


Fig. 814. — Single ticket — *Czechoslovakian State Rys.* — With railway emblem (winged wheel) (Red. 4/5).

Fig. 815. — Small size soft cardboard ticket — *Crosville Motor Services Ltd.* — The direction is indicated by punching (Red. 4/5).

on tickets remaining indefinitely in the hands of the public, it is up to it to give up selling return tickets at reduced fares.

As a matter of fact, return tickets are generally valid from 1 to 4 days in local (internal) service over short distances, for 10 days in Switzerland and Germany, and for 30 days after issue in the United States, or 60 days, 6, 9 and 12 months for

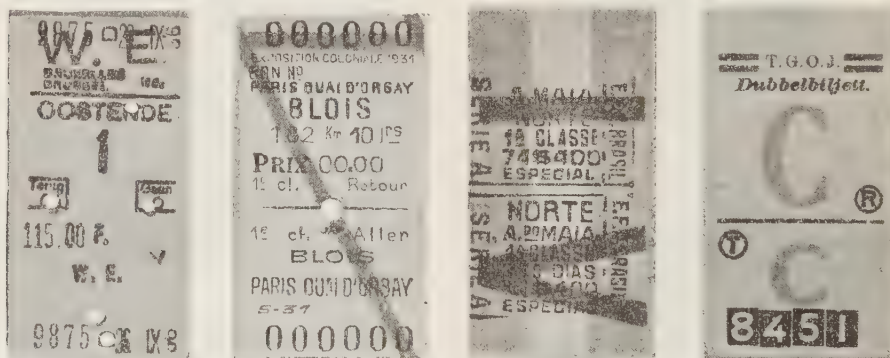
NEWCASTLE AND CARLISLE RAILWAY.
 No. _____ o'Clock, _____ 1837.
 From Wetheral; to and from Carlisle on the
 same Day.
 2nd Class—Paid 1s. 0d.
 This Ticket must be shown to the Station Keeper at Carlisle,
 previous to taking your Seat on your return.
 NOTICE.—No Gratuity allowed to be taken by any Guard,
 Porter, or other Servant of the Company

Fig. 816. — One of the first paper return tickets — Newcastle and Carlisle Ry., 1837 (Red. 3/4) — Printed fare.

long journeys ⁽¹⁾. That of tickets with combinable coupons is from 90 days for distances up to 3 000 km. (1 860 miles) and 120 beyond this mileage ⁽²⁾. The *International Sleeping-Car Company* issues return tickets for Syria and Egypt valid for two years by land.

Return tickets with a special period of validity have also been issued, for example :

« only on the Thursday of the week ending the 15th January 1898 » or « until Monday of the week ending... » (*London Brighton and South Coast Ry.*).



Vertical Edmondson return tickets (Red. 4/5).

Fig. 817. — Week-end ticket with spaces to be punched on the outward and return journeys — *Belgian National Rys. Co.* — Printed and issued by an *A. E. G.* machine — Numbered and dated top and bottom.

Fig. 818. — Return ticket issued with coupon for the Paris Colonial Exhibition — *P. O. Midi Ry.* — Distance shown — Valid for 10 days — Return portion indicated by horizontal stripe — Diagonal stripe showing the special category.

Fig. 819. — Return ticket (« Ida » and « Vuelta ») — *Central of Brazil Ry.* — Special category.

Fig. 820. — « Double ticket » — *T. G. O. J. (Trafikaktiebolaget Grängesberg-Oxelösund Järnvägar), Sweden.*

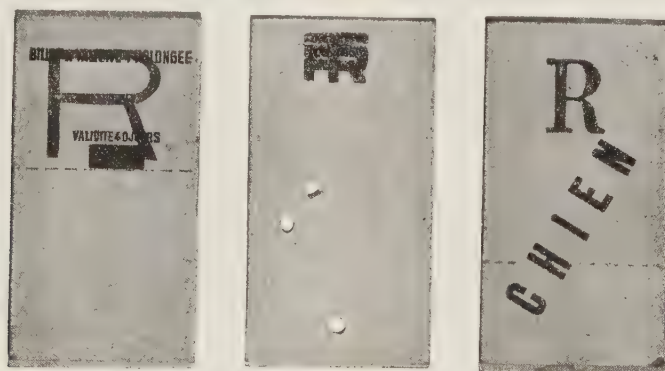
(1) It is generally longer in overseas countries. On the *New Zealand Government Rys.*, for example, these tickets are available one month for journeys from 20 to 100 miles, and three months for longer journeys.

(2) The period of validity of party tickets is shorter. It is reduced to 33 days for 3 000 km. (1 860 miles), to 45 days up to 5 000 km. (3 100 miles), 60 days up to 7 000 km. (4 350 miles), and 90 days beyond this mileage.

VARIOUS PERIODS OF VALIDITY FOR IDENTICAL JOURNEYS. — There are, particularly in England, return tickets for the same place, whose fare varies according to the period of validity. This mostly applies to cheap tickets which may be valid for 1, 2, 3 or up to 17 days. In addition, certain tickets valid for one day only are cheaper, and half-day excursion tickets cheaper still. These tickets are often surcharged with a large figure, showing the number of days for which they are valid. Bringing shoppers to town in the early afternoon and carrying them home later

sued to fill the trams. We will return to this point later.

In the U. S. A., where lists of factors are printed in order to avoid increasing the multitude of different tickets, a single type of ticket for various classes can be sold at the full fare, or as a return, or as an excursion ticket, with various periods of validity. It bears a list of figures from 2 to 12 for example, and that corresponding to the number of days it is valid for is punched. If the ticket is only good for a single day, no element of the series is clipped ⁽¹⁾.



Cards for Edmondson return tickets pre-printed in a second colour (Red. 4/5).

Fig. 821. — *Est Ry.* card for *A. E. G.* machines.

Fig. 822. — Card for *A. E. G.* machines with initials of the *Belgian National Rys. Co.*, in two languages.

Fig. 823. — Card for dog's ticket — *P. O.-Midi Ry.*

helps the Companies to fill slack periods.

The same idea applies to the special tickets issued by Road Transport. As it is not practical for them to issue tickets valid for several days, they have to offer some other advantage, such as lowering the price of return tickets used at slack periods and off days. In London, for example evening and Sunday tickets are is-

SYSTEMS OF RETURN TICKETS. — Returns are issued applying one of two distinct principles. In Central Europe, Switzerland, and elsewhere since the introduction of *A. E. G.* ticket machines, the whole ticket is left with the passenger on completion of the outward journey, and only collected when the return journey is made (figs. 817 and 823).

⁽¹⁾ *Bamberger Electric R. R. Co.*

But it is more usual to use two-portion tickets, one part being collected at the end of the outward and the other at the end of the return journey (figs. 818-819).

A third method, much used on the roads and even by some Railway Companies ⁽¹⁾, also utilises two-portion tickets, but here a countermark is issued in exchange for the return portion. This exchange ticket, which has no value in itself, is either issued at the booking office

fraudulent re-use of the tickets. The part retained by the employee serves for accountability purposes. The exchange ticket may show a whole series of values, the one corresponding to the ticket that has been collected being clipped (*fig. 282*). This allows of subsequent control en route.

Two dated tickets can also be issued ⁽²⁾, one for the outward and one for the return journey. This avoids the possibility of fraud mentioned above, but the ticket issuing work is doubled.

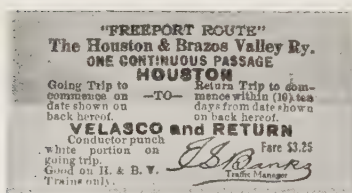
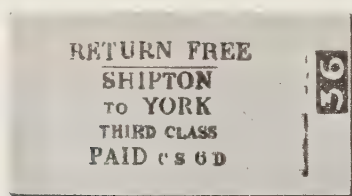
The *Central Argentine Ry.* uses a system related to the two previous ones. Its return tickets consist of two parts, but only the outward portion is an actual ticket. The return portion is, in fact, only a coupon which must be exchanged for a dated single ticket when the return journey is about to be made.

Many road and light railway Companies leave their tickets in the passengers' hands after cancelling the return portion.

ARRANGEMENT OF RETURN TICKETS. —

Many old Edmondson return tickets bore the name of the places between which they were valid, followed by the words « return » (*fig. 184*) or « and back » (*figs. 185 and 825*), which was sometimes printed on the reverse side. Others simply stated « return free » (*fig. 824*) ⁽³⁾, whereas in Ireland, others still showed the name of the station from which the return journey was made, but forgot to mention the place where the outward journey began.

The fare was regularly added in England towards 1852 only ⁽⁴⁾, and the following year, for the first time, tickets



Edmondson horizontal return tickets without detachable portion (*Red. 4/5*).

Fig. 824. — Old « free return » ticket, *North Eastern Ry.* (early forties) — showing the fare paid.

Fig. 825. — *Houston and Brazos Valley Ry.* (U. S. A.) return ticket (1913) — White portion to be punched on the outward journey.

ce or on the car (*fig. 295*) so as to call in the return portion of the ticket and prevent any conspiracy between passengers and the Company's employees, and

(1) *Cork, Bandon and South Coast Ry.,* Eire. « Return from Kinsale » ticket issued in Cork (*fig. 887*).

(2) *Compagnie Generale de navigation* (*fig. 176*).

(3) *North Eastern Ry.,* 1852.

(4) *North Eastern Ry.,* soon followed by the *London and South Western Ry.*

were perforated to facilitate splitting them. Previously passengers literally had to tear off the portion of the ticket which the collector claimed (*fig. 154*).

When tickets with detachable portions first appeared, the extremities of the journey were often printed in the same order on both portions (*fig. 154*) and these were frequently numbered « 1 »

Tickets have frequently been printed at issuance on carton pre-printed in colour with certain distinctive markings ⁽¹⁾ (*fig. 169*, *figs. 821 to 823*).

The two portions of the ticket are not always the same size (28 mm.×28 mm.= 1 1/8"×1 1/8"), and vary pretty considerably :

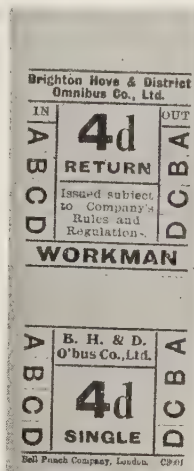
<i>Russian Imperial State Rys.</i>	15 and 40 mm. (5/8" and 1 1/2")
<i>P. L. M.</i>	20 and 36 mm. (3/4" and 1 3/8")
<i>Swiss Federal Rys.</i>	24 and 33 mm. (15/16" and 1 5/16")
<i>Midi</i>	25 and 32 mm. (1" and 1 1/4")

The arrangement of the portions varies just as much, although the « outward » portion is generally on top ⁽²⁾.

There is just as much variety in the case of return tickets with control stubs :

<i>The Leopoldina Ry., Brazil</i>	18, 23 and 17 mm. (11/16", 7/8" and 11/16")
<i>The Londonderry and Lough Swilly Ry.</i>	14, 20 and 23 mm. (9/16", 3/4" and 15/16")
<i>The « Nord Belge » lines</i>	13, 20 and 24 mm. (1/2", 3/4" and 15/16")

The method used for distinguishing the return portion of Edmondson tickets has undergone many variations and does not appear to be definitely settled. After the earliest distinction by colour, monochrome tickets appeared and the return portion was surcharged with distinctive markings such as a frame (*fig. 264*), a red stripe down the middle or along the ticket's small side (*fig. 228*), a diagonal



Soft cardboard return tickets used by English Road Transport Companies (Red. 4/5) — Printed by the Bell Punch Co.

Fig. 826. — York Pullman Bus Co. ticket with a small outward and large return portion — The direction to be punched on the outward portion and the day in each of the two columns of the return portion.

Fig. 827. — Ticket with stub for the outward journey and list of fare stage letters on both portions — Brighton Hove and District Omnibus Co. Ltd. — Category : workman.

and « 2 » in small type, which useless practice only died out towards the end of last century (*figs. 444 and 776b*).

(1) In France the letter « R »; in Belgium the letters « R » and « T » intertwined, these being the initials of the French word « Retour » and its Flemish equivalent « Terug » (*fig. 822*).

(2) On the *Paris Lyons and Mediterranean*, the *Midi*, and in Switzerland.

stripe or cross bars (*fig. 339*), a large letter « R » (« return » or its equivalent), in heavy or skeleton type, either in black or in colour (*figs. 786-821*).

In Germany and in Switzerland, the vertical return tickets have a central white band 10 mm. ($3/8''$) wide, parallel with the long sides. This arrangement has been standardised for tickets issued in accordance with the « International Convention » and for the coupon-booklets and the new thin card tickets as prescribed by the *International Union for the Issue of Combinable tickets* and the *Ver-ein*. Central European Sunday return tickets have a similar band, but in blue instead of white.

In many countries, however, it is considered sufficient to print the words « outward » and « return » or their equivalents at the same time as the rest of the ticket.

SPECIAL CATEGORIES OF RETURN TICKETS. — Some English return tickets are overprinted with the initial letters of the category they come under : *T* (tourist), *S* (short period), *WK* (workman), and so on.

In addition to ordinary returns, there are a number of special return tickets for different classes of passengers (see following Chapters).

COLOURS OF RETURN TICKETS. — All Edmondson return tickets were originally bicoloured; they still are when the return portion has no distinctive markings.

When there were two kinds of single tickets, their colours were often combined on returns. British railways having a different range of colours for the outward and return journeys, used these

same colours on the two halves of their Edmondson return tickets, the going portion with its corresponding colour usually being the left hand one, and the returning portion the right. There were thus, according to the direction in which the journey was undertaken, two sets of return tickets for each class of travel, differing in the order of the colours which were reversed on one of the sets.

In Belgium, where there was a different series of colours for local and for express trains, the colours for the two categories were combined on return tickets of the same class.

In Japan, instead of a uniform colour, there is a safety background of a different shade. A pale shade of the same colour is printed on the return half, so that the ticket looks as though it were printed in two shades of the same colour.

Certain LIGHT RAILWAY COMPANIES have tickets showing railway scenes for publicity purposes. One such Company even prints them on postcards which are left in the possession of passengers after having been punched (*figs. 951-952*).

On the Continent, ROAD TRANSPORT uses all kinds of paper return tickets which are finally cancelled on the return run. To prevent their misuse the next day, the factors concerned are indicated on the printed lists of the hours, days of the month, and months, they bear. Certain tickets even have a list of the numbers of the trains on which they may be issued ⁽¹⁾.

Workmen's returns are only valid at certain hours of the day. The day can be added in pencil to the name of the month ⁽²⁾.

It is also possible to ink-stamp the date

(1) *Belgian National Light Railways Company.*

(2) *Ans-Oreye Railway Co.* — These tickets are valid before 8 a. m. and after 6 p. m.

and hour of the journey, which considerably speeds up the service. At halts with booking offices these items can be punched ⁽¹⁾.

Very few SPECIAL CATEGORIES OF SOFT CARD RETURN TICKETS ⁽²⁾ are issued, except in England. Tickets available for various categories are frequently used for single or return journeys, with or without transfer, according to the spaces punched (*fig. 187*); others have stubs for the purpose (*figs. 826-827*). In the first case each « in » or « out » trip is clipped, and in the second case, the stubs are removed.

The detachable stub of paper tickets of the kind is on the left-hand side; then comes the outward portion, and finally the return portion. The lists of the days and months are usually printed on the return ⁽³⁾, and the number of the trains on the outward portion, as this necessary information must be shown on the part retained by the passenger.

The text varies according to the portion of the ticket collected first. On the Brussels-Enghien line, for instance, the stub was 22 mm. (7/8") wide, the main portion of the ticket 108 mm. (4 5/16"), and the return portion only 8 mm. (5/16"), whereas on the *Naples-Nola-Baiano Ry.* the large central part was the return portion and the small coupon was

valid for the outward journey. The detachable portions were collected in the second or first vehicle respectively.

MULTIPLE RETURN JOURNEYS. — Apart from seasons, tickets are sometimes issued for two return journeys, especially to workmen to get to their work and return home for lunch (*fig. 186*). The validity is limited to the corresponding hours of the day ⁽⁴⁾.

C. THROUGH AND INTER-LINE SINGLE AND RETURN TICKETS.

Combined or inter-railway services (« interline » or « through tickets » in England and « multiline passages » in the States) comprise fixed journey tickets, semi-blank and blank tickets used as required. In practice, there are

Edmondson tickets,
Paper tickets,
Cards (*fig. 839*),
Books of coupons.

Some of these one-piece tickets cover the whole journey; others divide it into a number of partial trips so that each Company may collect its own coupon or coupons.

Most Edmondson tickets and all the « International Convention » ones are one-piece tickets covering the whole

(1) *Ecluse-Plan Ropeway.*

(2) Tickets for parties (*National Light Rys. Co.*), soldiers, and pilgrims (*Chemins de fer de Caen à la mer*).

(3) *Bordeaux-Cadillac.*

(4) At Wallsall, tickets have four spaces reserved :

One, for the « morning journey » before 9 a. m.;

Two for the « mid-day journey » between 12.30 and 2.30 p. m.;

And one for the « evening journey » after 2.30.

At Tynemouth and Brighton, in addition to the main part, workmen's double return tickets consist of three coupons which are detached successively.

On the other hand, similar tickets on the *Western S. M. T. Co. Ltd.* consist of a single sheet, bearing lists of dates and hours which are perforated in turn on each journey.

Those of the *London County Council Tramways*, now issued by the *London Passenger Transport Board*, are similar.

journey one way, as are also British through paper tickets (*fig. 425*).

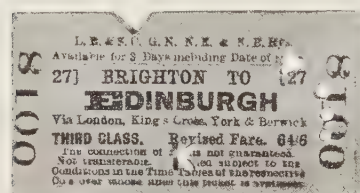
When coupons have to be collected for each part of the journey, it is possible to issue them as booklets, as is done in Europe or, like in America, to arrange them one after the other in long strips known as « band tickets ».

For journeys outside their own lines, Continental and British Companies use EDMONDSON TICKETS with the names of the various Companies concerned (*figs. 828 and 835*). Formerly, they even had the

Edmondson tickets are seldom used for combined rail and boat journeys save when both are owned by the same Company ⁽²⁾ (*figs. 177 and 830*). These tickets are often divided into separate coupons for the rail or water sections.

In New York, an exchange ticket is issued for running through the Hudson River Tunnel (*fig. 299*).

In international traffic, the use of Edmondson tickets is limited to the more usual journeys, such as those from Paris, Lille or Calais to the larger Belgian



Through Edmondson tickets (*Red. 4/5*).

Fig. 828. — Ticket with the initials of the four Companies concerned : the *London Brighton and South Coast Ry.* and the three components of the « *East Coast Route* » — With notice : « The connection of trains is not guaranteed ».

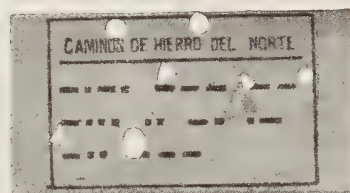


Fig. 829. — *Northern of Spain Ry.* — Back showing the word « *combinado* » (combined), in Morse code.

name of each interline service printed in advance (*figs. 153 and 837*).

Spanish throughs were distinguished by the word « *combinado* » printed on the back in Morse code (*fig. 829*).

Certain British Companies formerly used Edmondson tickets of different colours for « *local* » and through traffic ⁽¹⁾. This distinction even occurred for dog tickets.

towns, from Brussels and Antwerp to the principal Dutch or German cities, and from capital cities to other foreign places ⁽³⁾ (*figs. 831 to 833*).

In addition, as many passengers have rebates in their own country and not abroad, tickets are issued in certain stations, when there is sufficient demand for them, at full fare from the frontier station only to destination abroad. Such

(1) The *London and South Western Ry.*, the *London Chatham and Dover Ry.*, the *Furness Ry.* and the *Midland Ry.*, whose colours for home services were yellow and buff, for 1st and 3rds, and for through services, violet and green.

(2) *Southern Ry.*, *London Midland and Scottish Ry.*

(3) Some Italian tickets have a control space for each 100 km, from 100 to 1 200 km.; Canadian ones, for various mileages.

tickets are sold in Paris, available from the Belgian frontier to Brussels while in Brussels, tickets from the French frontier to Paris are sold (fig. 834).

Certain international blank tickets with check coupons are longer than Standard Edmondsons (fig. 63).

85 mm. (4 3/8" by 3 3/8"), of which space 100 × 70 mm. (4" by 2 3/4") is available for the letterpress (fig. 840). In England, blank paper tickets are used, for « through » traffic and in the United States ticket-bands printed on « Association Ticket-Paper ».



Through Edmondson tickets (Red. 4/5).

Fig. 830. — By boat and train — Separate coupons for the outward journey and a single coupon for the entire return journey — *Belgian State Rys.* (about 1860).

Fig. 831. — International ticket with many alternative routes — Issued before the War by the *Italian State Rys.* — Safety background — Two languages: Italian and German.

Fig. 832. — *Belgian State Rys.* return ticket of the German type, for an international journey (1909) — Usual route on the outward journey — Choice of two routes for the return journey.

Through tickets are sometimes overprinted with the initials of an intermediate line run over in the course of the journey. This was the case about 1904 when using the *Waterloo and City Ry.*, on route, but for reasons which had nothing to do with railway practice, the initials W.C. have been vetoed (fig. 838).

Combined single and return tickets over main-line railways and London underground lines are generally similar to the through scheme tickets issued by the various Companies (fig. 852).

In addition to Edmondson fixed-destination tickets, blank thin card tickets are used for interline services in Germany and the Netherlands. They are 110 ×

Most Continental Railway Companies belong to the *International Railway Transport Committee*, which published on the 1st January, 1936, a set of Regulations for international passenger railway tickets (« M. B. I. ») and a Collection of 100 specimens in colours.

This includes :

Edmondson tickets, 31 × 57 mm. (1 3/16" × 2 1/4");

Very thin cardboard or stout paper tickets, 88 × 125 mm. (3 1/2" × 5") or half this size, 62.5 × 88 mm. (2 1/2" × 3 1/2") (fig. 839);

Booklets of detachable coupons 88 × 125 mm. (3 1/2" × 5") (fig. 89);

Booklets of combined coupons 100 × 142.5 mm. (4" × 5 5/8") (figs. 91 to 93);

Sheets for party transport or « transport bulletins » 210 × 300 mm. (8 1/4" × 12").

These regulations apply to a large number of categories of tickets grouped as follows :

- I. Edmondson single or return tickets — children — various kinds of trains — week-end.
Tickets with control stubs, both single or return.
Countermarks for collective (party) tickets;
- II. Paper coupon tickets between fixed places, with or without control stubs and itinerary on the back — Both single and return;
 1. For groups and parties;
 2. Semi-blank tickets with a list of a number of destinations;
 3. Blank tickets, with or without check stubs for children, single and return;
 4. Sunday tickets.
- III. Fixed-destination booklets of coupons — Single and return, semi-blank and party tickets;
- IV. Combined coupon booklets — for fixed destinations, blank, and for groups or parties;
- V. Collective tickets and transport bulletins.

All tickets coming under these regulations bear a monogram formed of the letters C and I interlaced ($\text{C}\overline{\text{I}}$), the initial letters of « Convention Internationale » (figs. 700 and 840).

The *International Union for the issue of Combinable coupon tickets* also published, in 1935, a book of regulations with a series of specimen tickets.

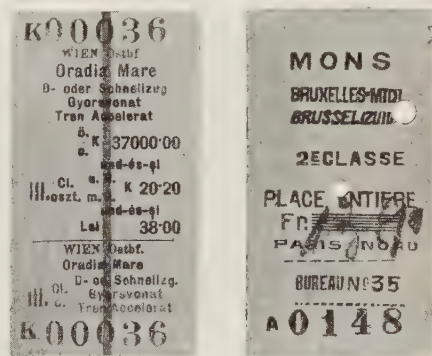
D. TRANSFERS FOR RAILWAY AND ROAD TRANSPORT

must meet two principal objects : they must have a limited period of availability over a limited route and it must be impossible to use them a second time.

So as to limit the period of validity, it is essential to indicate the time of issue.

This is done by marking the factors concerned in lists of the months, days and hours or by ink-stamping them.

Limitation of the journey is intended in particular, to prevent the unlawful use of transfers for travelling back to the



Edmondson tickets (Red. 4/5).

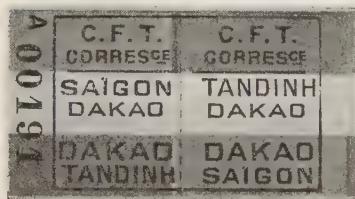
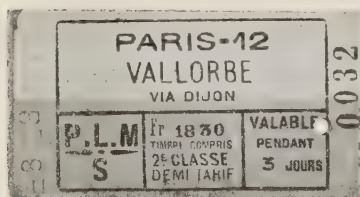
Fig. 833. — Through ticket for express train — *Austrian Federal Ry.* — Issued during the inflation period with fare in gold and in depreciated currency — Vertical stripe, « available on all trains ».

Fig. 834. — Ticket for the Belgian part of through journey issued at Paris Nord — *Nord Ry. Co.* and *Belgian National Ry. Co.* — The price written on the « grid » varies with the exchange rate.

starting point. For this purpose, the ticket bears a list of places or a map of all the connecting lines for which it is valid, or else, when it is valid over the whole system, it shows on what line it was issued, this being the only one on which it cannot be used again.

So as to prevent its being used a second time, it can be collected on the second journey and exchanged for a countermark, or if left with the passenger, it can be mutilated by detaching a portion, or be cancelled in some other way.

It is customary, in Europe to cancel tickets or indicate the factors applying to



Edmondson tickets for combined journeys (Red. 4/5).

Fig. 835. — Franco-Swiss ticket, 1908 — Initials of the Companies in the bottom left-hand corner (*P. L. M.*, and « *S* » for the Swiss Railways — Fare « including duty stamp » — Category : half fare ticket divided into two parts, one being white, parallel with the long side; the single tickets of other French railways were vertical.

Fig. 836. — *Tonquin Rys.* transfer — In several very bright colours.

Fig. 837. — *Belgian State Rys.* bilingual return ticket in two halves (early sixties) — Intended specially for destinations served by the *Grand Central Belge Ry.* — The return half has a red stripe — Indication of the route to be followed.

Fig. 838. — Through ticket valid over two railways and by intermediate *Waterloo and City Ry.* — Initials of the latter in skeleton letters.

any given journey, by pencil marks. In the U. S. A., this is done by punching the tickets in the proper spaces.

Many Railways, particularly in England, have no special transfer tickets; multiple-use tickets are utilised instead and specially punched. Tickets issued on urban railways show the exchange stations (figs. 88, 165, 167, 197). On the Paris *Metropolitain* where there is only one fare for each class, the ticket only bears the name of the issuing station.

The slogan

« Connection is not guaranteed »

is to be found on most road tickets. It was also formerly printed on old railway paper tickets and even on certain Edmondson ones (fig. 828).

Various systems are used for transfers :

- (a) Two tickets are issued on the first trip;
- (b) A single ticket only valid for the second trip is issued on the first trip;
- (c) A two-portion ticket is issued during the first trip;
- (d) A single ticket is issued on the first trip and is valid over two lines in succession.

(a) ISSUE OF TWO TICKETS ON THE FIRST TRIP. — One of the tickets bearing all the necessary information covers the first part of the journey, the other being a « correspondance ticket » proper. In fact, it is a supplementary ticket allowing an extra trip corresponding with the total value of the ticket to be made (figs. 841-

⚡ Traffic international Internationaler Verkehr	
Pour tous les trains Für alle Züge (trains P, PFD et L supplément) (für P-, PFD- und L-Züge Zuschlag)	No <input type="checkbox"/> Inescribable Nicht anzeigbar
RETOUR - RÜCKFAHRT	
en chiffres in Ziffern	en toutes lettres in Buchstaben
pour für	personnes Personen
de von	
à nach	
via über	
3. Cl. Valable Gültig	en chiffres in Ziffern
en toutes lettres in Buchstaben	jours Tage
Timbre à date -- Tagesstempel	
Fr.	

⚡ Traffic international Internationaler Verkehr	
Pour tous les trains Für alle Züge (trains P, PFD et L supplément) (für P-, PFD- und L-Züge Zuschlag)	No <input type="checkbox"/> Inescribable Nicht anzeigbar
ALLER - HINFAHRT	
en chiffres in Ziffern	en toutes lettres in Buchstaben
pour für	personnes Personen
de von	
à nach	
via über	
3. Cl.	en chiffres in Ziffern
en toutes lettres in Buchstaben	jours Tage
Timbre à date -- Tagesstempel	

Deutsche Reichsbahn-Gesellschaft. Kontrollbezirk Bayern r. d. Rh.

Deutsch-schweizerischer Personenverkehr.

Gültig 4 Tage 00495

Fahrkarte

für eine Person*
 für ein Kind*

Für alle Züge,
 (für L-Züge, in Deutschland auch für FD-Züge, Zuschlag)

Tag der Ausgabe
04. März 1929

Von **Nürnberg Hbf. (MER)**

nach *München*

über *München - Ingolstadt - Regensburg - Linz - Wien*

2. Kl. *2. Kl.*

Gültig R.H.

*) Nichtzutreffendes streichen

Blank paper tickets (Red. 3/4).

Fig. 839. — International return ticket conforming with the regulations of the « International Convention » : Monogram : « C. I. » — White band showing that it is a return ticket — Vertical line meaning that it is « available on all trains ».

Fig. 840. — Thin cardboard ticket for Germano-Swiss traffic — Deutsche Reichsbahn — With a frame the colour of the class — For « one person » or « child » — Surcharged with the initials of the « International Convention ».

842). This kind of transfer has died out.

(b) ISSUE OF A SINGLE TICKET ON THE FIRST TRIP AND VALID FOR THE SECOND. — This system, which was widely used in Paris, was an improvement on that of most lines where no tickets were issued at all. These were single-fare routes (30 centimes inside and 15 on the upper deck) and the conductor merely recorded the number of passengers by working a recording bell. He also issued on demand transfers which bore the number or the distinguishing letter of the original line (figs. 188-189-765). They were issued to 1st-class passengers, while to obtain them those travelling outside had to pay an additional 15 centimes, the difference between the two fares. Only approximate control was possible, as the conductor could issue free tickets to anyone up to the total number of passengers who had travelled inside.

The correspondance tickets on the *Compagnie Générale des Omnibus* and the *Tramways de Paris et du Département de la Seine* were of cardboard like the Edmondsons and their colour was changed at frequent intervals. Although this system was basically unsound, it remained in use for many years.

In 1837, soon after the creation of the London « *Compagnie Générale des Omnibus* » (The London « General Omnibus Co. ») the French system of « correspondance tickets » was introduced under this name and the printer attempted to make them as attractive as possible. Unlike in Paris, however, the trial was unsuccessful and was soon discontinued.

Many of the American transfers come under the category of tickets we are now considering. Unlike the practice elsewhere, many of them have no value on

some kinds of cars unless an extra 2 or 3 cents has been paid in the course of the first or second trip, as the case may be.

In this group can also be included the road transfers which are sold in railway stations to complete the journey. In certain French stations, special Edmondson tickets are issued for this purpose (fig. 848), and in Belgium, Edmondson tickets for the light railways on the Coast, were sold by the *State Railways* staff.

In England, a ticket bought at the booking office for a further journey by 'bus is usually collected on the 'bus and an exchange ticket handed out instead (fig. 831).

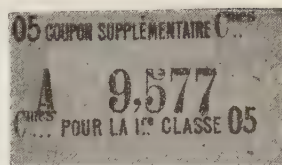
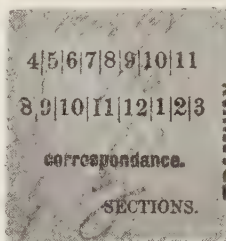
(c) ISSUE DURING THE FIRST TRIP OF A SINGLE TICKET WITH TWO OR MORE COUPONS. — The body of the ticket applies to the trip in the first car and each coupon to trips in one of the other cars used on successive stages of the journey. As many as four may be employed. This is often the case with American transfers (figs. 190-191) and sometimes on British Road Transport (fig. 186) and Continental paper tickets.

(d) ISSUE IN THE FIRST CAR OF ONE TICKET VALID ONLY FOR TWO SUCCESSIVE TRIPS. — This is the more general method; there are several variations.

The conductor marks the factors, fare, time of issue, and route, relating to the journey. Two alternatives are possible : indicating either the line over which the first trip takes place or else the line or group of lines used for the second.

Paper tickets are used for the purpose, on the Continent.

When the transfer is valid, obviously with the exception of the line on which it was issued, on all the lines of a system having a single fare for each class, it is

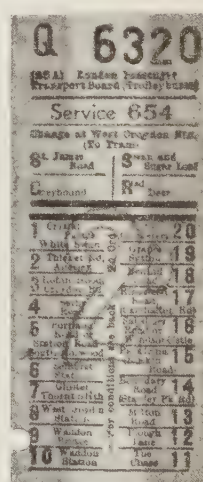
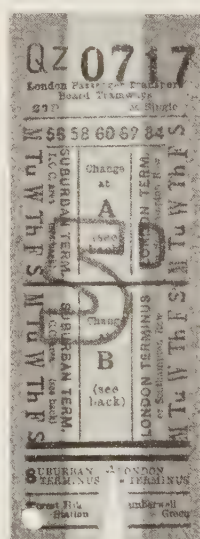
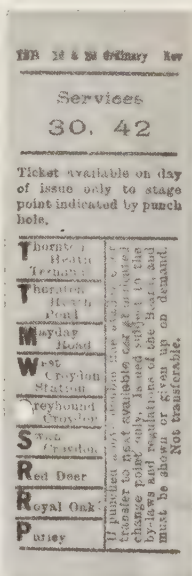
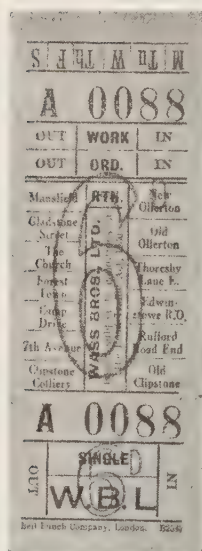


Old paper tickets (Red. 3/4).

Fig. 841. — « Correspondence ticket » of the *Brazilian Tramways Co.*, Brussels (about 1868).

Fig. 842. — « Correspondence ticket » of the *Antwerp National Tramways* (about 1870) — Printed list of hours; the other information was added by hand.

Fig. 843. — Supplement for using a 2nd-class ticket in 1st — *Belgian Street Ry. and Omnibus Co.*, Brussels (1868).



Soft cardboard tickets (Red. 4/5).

Fig. 844. — Fixed-value ticket showing the fare stages — *Wass Bros. Ltd.* — The direction is shown by punching the words « in » or « out » — Category : ordinary or workman, single or return — If used as a return, the day is punched as well.

Figs. 845 and 846. — Through or transfer ticket of the *London Passenger Transport Board* — « To find where to change, see back ».

Fig. 847. — Through trolleybus ticket for single trip whose stage points are shown or transfer to tram cars at places indicated by their initials.

only needful to show the issuing line (*fig. 221*). If the fares on the second one vary with the distance travelled, the exchange point or the outside limit of the journey paid for must be shown as well. This is done by means of lists or, more simply, by a diagrammatic map of the system.

This procedure obviously requires different tickets (generally distinguished by their colour) for different classes and fares.

At Ulm, and in a few other places, Edmondson tickets have been used; in England, somewhat larger ones made of soft cardboard. Tickets which can be used at will for either a through or connecting journey are widely used (*figs. 846-847*). Only in the latter case is it necessary to indicate the time. On the through journey, the fact that a ticket has been detached from its counterfoil suffices to make it useless for a further journey. To validate it either for a single or for two trips, the date and the time must be nipped.

The same idea has been applied in a modified form in certain towns like Lyons, where the conductor carries a date stamp. The ticket is only valid for the connecting journey when it bears printed mention of the fact (*fig. 487*).

In London, the tickets of the *South London Tramways* (*fig. 849*) and those of the *London County Council Tramways* were valid not only for any of a number of through trips, but also for a series of trips using two successive routes. The transfer points were given on the face of the ticket (*fig. 847*), on the back, or on

the back with a reference on the face (*fig. 845*).

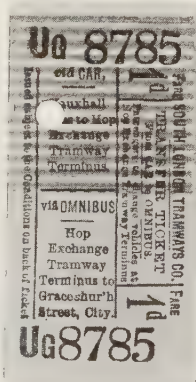
The same considerations apply to transfers valid on two lines belonging to two different Companies ⁽¹⁾. The settlement between them can be made in various ways :

(a) By taking the number of combined journeys as equal in both directions;

(b) By ascertaining by means of their serial numbers, the number of transfers issued. There is an element of inaccuracy in this method, as there is no way of checking the number of transfers really used;

(c) By exchanging the transfer against a countermark. This gets over the drawback of the previous method.

The same applies to journeys by tram or 'bus and by underground ⁽²⁾.



« Correspondance » tickets (*Red. 4/5*).

Fig. 848. — Edmondson ticket issued by a special machine, *Nord Ry. Co.*

Fig. 889. — Soft cardboard ticket — *South London Tramways Co.* — From tram to omnibus — With a series of coloured stripes.

(1) In Brussels, transfers between the *Tramways Bruxellois* and the *Société Nationale des Chemins de fer vicinaux* or the *Autobus Bruxellois*.

In London, between the *London General Omnibus Co.* and the *London United Tramways*; between the *London County Council Tramways* and the *Croydon Tramways*.

(2) In London : Tickets available on the *Metropolitan Electric Tramways*, the *London General Omnibus Co.*, or the *London United Electric Tramways* (*fig. 853*) and the Underground or tubes.

The earlier tickets were issued by the *London United Tramways* for a combined journey with the *District Ry.* which was controlled by the same group. These were paper tickets with a list of routes and the corresponding fares, one of which had to be punched (fig. 853). The *London Passenger Transport Board* now has the same sort of tickets for 'bus and tube trips but in order to facilitate checking, it also uses duplex paper tickets (fig. 224).

Fixed-value soft card tickets show the journeys that can be made for the stated fare by passengers starting from a series of lines (numbered by service). They also show the transfer points and the places to which the holder can travel by the various underground railways (fig. 855).

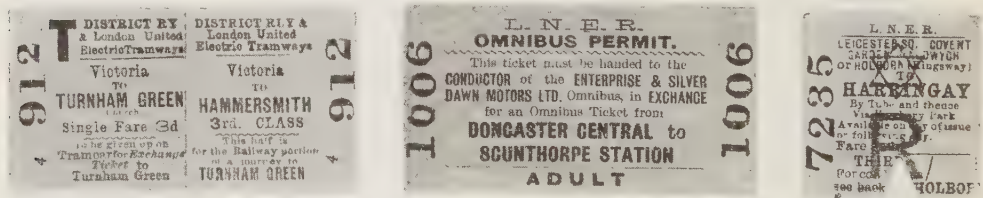
Figure 850 is a ticket for a combined tram- and rail trip where another principle has been applied. It has two portions, one valid for the rail section, and the other is not only valid in the tram,

but has to be exchanged in the car for a ticket for the return rail trip.

Return tickets valid over two successive lines in each direction are numerous in England for successive road trips and also for road and rail, or road and boat journeys. Both parts of the *Birkenhead Corporation* return tickets, for instance, are valid by tram or 'bus and then by ferryboat to Liverpool and back.

In London, duplex paper tickets involve a change of car en route ⁽¹⁾ (fig. 224). The tickets previously issued by the various Companies and including an underground section were identical with those for a single method of transport.

Provincial soft card return tickets often have a number of detachable coupons which are collected in turn by the services concerned (fig. 186). When four sections are involved, it may happen that the ticket only has three portions instead of four, as the issuing Company may clip



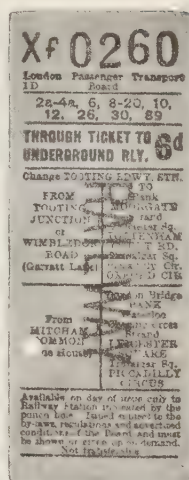
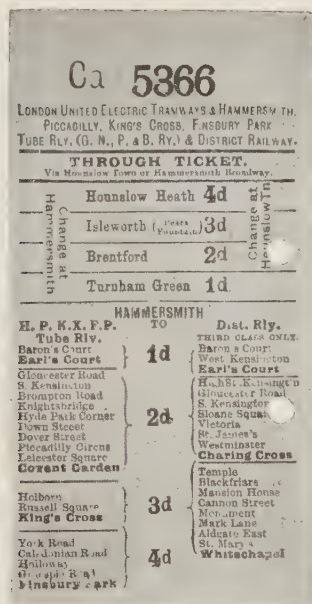
Edmondson correspondence tickets (Red. 4/5).

Fig. 850. — Transfer from rail to road : *District Ry.* and *London United Electric Tramways* — Ticket in two halves, one for the rail journey and the other to be exchanged in the tram for a countermark.

Fig. 851. — *L. N. E. Ry.* — Issued at the station where the railway journey commenced and to be exchanged for a countermark in a vehicle of the *Enterprise* and *Silver Dawn Motors*.

Fig. 852. — Return ticket issued by the *L. N. E. Ry.* for a journey including a railway section and another section on one or other of the London underground railways — Special distinctive mark (double triangle).

(1) Ticket of the *Brighton Hove and District Omnibus Co. Ltd.* Beginning at the bottom, the coupons are 25, 20, 20 and 43 mm. (1", 13/16", 13/16" and 1 11/16") respectively. Between New Brighton and Liverpool where the journey consists of a bus run, then a ferry crossing and back, there are coupons for the two ferry crossings, and the first bus run, which is exchanged for a countermark.



Combined tickets for road services (Red. 3/4).

Fig. 853. — Old paper ticket to multiple destinations, issued by the *London United Electric Tramways* and available on two underground lines, the *Great Northern, Piccadilly and Brompton Ry.* and the *District Ry.*

Fig. 854. — Italian return ticket with additional coupon for the Lido Baths (1897) — Printed in three vivid colours — *Societa Veneta Lagunare*.

Fig. 855. — Ticket with multiple starting and destination points, available in turn on two lines, first tram or bus, and then underground railway — *London Passenger Transport Board*.

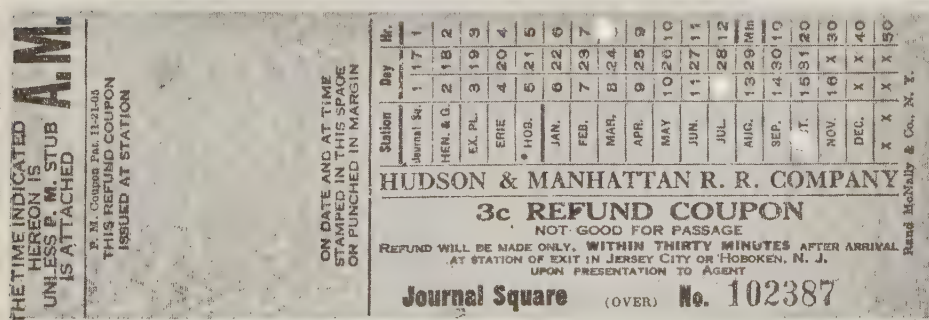


Fig. 856. — Refund coupon issued to passengers who paid for the whole journey to New York and only travelled part of the way on the opposite bank — *Hudson and Manhattan R. R. Co.* — The factors concerned shown by punching — Safety background (Red. 3/4).

the body of the ticket both during the first and during the last stage ⁽¹⁾.

When the different lines belong to the same Company, one-piece tickets may be used, the four conductors in turn cancelling the proper spaces ⁽²⁾. Sectional paper tickets are used instead on the Continent ⁽³⁾.

American Railway Companies also issue transfers, mainly between different stations in the same town. They are usually similar to road transfers in appearance, and there is no need to discuss them here. It may be mentioned, however, that it is possible to use only one type of transfer whatever the category and class of the full-fare or cheap ticket held by the passenger (figs. 112 and 857) ⁽⁴⁾.

Transfers play a particularly important part in the case of urban and suburban systems; they are so widely used together with tokens and passes, that they affect the entire operation. Each transfer can be used over a series of lines at any time of the day, but in each case the time of issue and the line or lines where they can be used must be clearly indicated. As some of these factors are only decided on in the cars, the value of the system depends on the simplicity and quickness of the operations involved. This is of ca-

pital importance as the whole service will be speeded up and the receipts increased accordingly. Whenever the transfers are improved the methods used have therefore been gradually perfected and may be grouped as follows :

USING PUNCHES :

(a) Old types with lists of stations, hours and dates;

(b) Arrangements reducing the number of perforations required;

MIXED SYSTEM BY PUNCHING AND CUTTER SEVERANCE :

(c) Stub with scale of hours;

(d) Stub with scale of places.

SEVERANCE BY NOTCH CUTTERS :

(e) Stub with crossed scales.

(a) PUNCHING THE NAMES OF STATIONS AND TIME OF USE. — Early transfers (figs. 860 to 863) bore lists of all the factors, those concerned being selected by punching or clipping :

The month, day, and hour of use, and fractions of 10, 15, 20 or 30 minutes;

The line to be used.

This needed a good deal of punching. It soon became the practice to show the date by overprinting it very visibly in advance, and the month was sometimes punched in advance in the list concerned. But even so, and in the case of transfers

(1) Bus journey in the *Wallasey Corporation* buses, followed by a ferry crossing from *New Brighton to Liverpool*.

(2) *London County Council Tramways*.

(3) At *Marseilles*, tram journey followed by the *Ascenseur de Notre Dame de la Garde* (ropeway), and return (1907).

(4) The transfers on the *Pennsylvania Line* to *Logansport, Ind.*, can be used for 10 different ratings : 1st or 2nd class, mileage exchange, return, excursion, clergy, single or return party ticket, emigrant, or half-fare; that shown in fig. 857 for 6 ratings only, by any one of 25 lines.

The transfers of the *Seaboard Air Line Ry.* are exceptional in shape, and can be used for 14 different rates.

Those of the *Pittsburgh, Cincinnati, Chicago and St. Louis R. R.* are cards with dates covering 8 years.

The American « band » tickets include, if necessary, special coupons for the transfer from station to station.

Randolph St.	Van Buren St.	ROBERTS Canal	31st Street	39th Street	43rd Street	47th Street	53rd St. (River)	57th Street	63rd St. (River)	67th Street	73rd St. (River)	79th St. (River)	85th St. (River)	91st St. (River)	97th St. (River)	103rd St. (River)	109th St. (River)	115th St. (River)	West Pullman	Blue Island	137th St. (River)	Harvey	Homewood	Flossmoor	Mattison																																																							
ILLINOIS CENTRAL RAILROAD COMPANY SUBURBAN TRANSFER TICKET Good from 53rd or 63rd Street to station designated when presented with ticket of class and destination indicated by above punch marks, on date of issue prior to expiration of time limit. Form S. T. <i>Passenger Traffic Manager</i>																																																																																
<table border="1"> <tr> <td colspan="12">JULY 1933</td> <td colspan="2">1</td> </tr> <tr> <td colspan="12">No. 45</td> <td colspan="2">2</td> </tr> <tr> <td colspan="12"></td> <td colspan="2">3</td> </tr> <tr> <td colspan="12"></td> <td colspan="2">4</td> </tr> </table>																									JULY 1933												1		No. 45												2														3														4	
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Old American paper transfer (Red. 3/4).

Fig. 857. — Indication through multiple punchings — Lists from which the day of the month, the method of payment, morning or evening travel, have to be selected — List of Chicago stations — *Illinois Central R. R. Co.*

used after the War, it was still necessary to indicate too many factors.

The division into minutes of the hour in question;

The lines;

The journeys, « from » and « to ».

For the benefit of passengers, many transfers had on the back a reference list of the exchange points with other lines, as is sometimes done in Europe, in Berlin for instance.

(b) ARRANGEMENTS REDUCING THE NUMBER OF PUNCHES. — It was found possible to halve the number of some of the punches by printing lists in which certain factors were repeated, so that two factors could be selected at once by a single perforation. For example, instead of one list of minutes, these were repeated for each hour (fig. 863); whichever list

of minutes was punched, also showed the hour concerned.

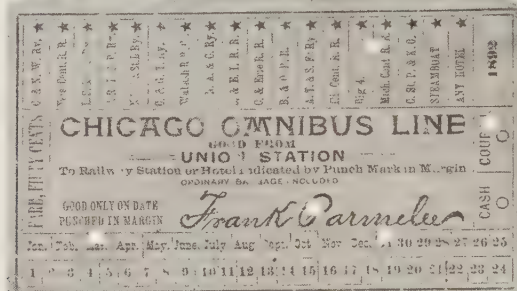
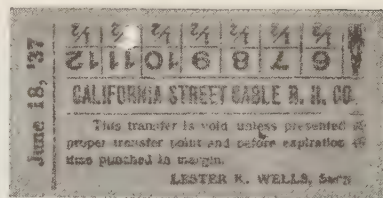
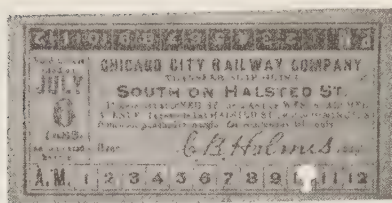
In the same way, owing to lack of space, old transfers had only given the hours from 1 to 12, and to make it clear whether it was morning or afternoon, a space labelled A.M. or P.M. had to be punched. By dividing the lists of « from » places or « to » places into two, it was merely necessary to perforate the left side in the morning and the right side after mid-day ⁽¹⁾ (fig. 863). In spite of this at least three perforations were needed to show all factors clearly, and this was still too much.

(c) STUBS WITH SCALE OF HOURS. — PUNCHING AND CUTTER SEVERANCE. — Only one of the indications, the lines for example, was retained in the body of the ticket and the list of others (hours and minutes) was in table form ⁽²⁾ ,fig. 248).

(1) The columns in the list can also be subdivided by a single line drawn through the centre, or the first half of the names can be printed in positive (black on white) and the second half in negative type (white on black).

Transfers have also been given a P. M. stub. When the transfer is issued in the morning this is removed (figs. 247-249).

(2) Certain hours can be made to stand out — from 12 p. m. to 12 a. m. for example — by printing black bands down either side of the list (Des Moines).



Old American card transfers (Red. 3/4).

Fig. 858. — *Chicago City Ry. Co.* — Printed date, 1888 — Evening hours in negative type.

Fig. 859. — *California Street Cable R. R. Co.*, San Francisco, 1937 — Printed in green ink.

Fig. 860. — *Chicago Omnibus Line* — Transfer card for passengers from the railway to one of the stations or hotels listed (1892).

The first line alone needed punching and the ticket was severed by a cutter between two successive factors on the stub's table. Not only is the date printed in advance, but the direction of the journey is also indicated by punching the geographical direction (East, West, North or South).

The introduction of a third element — colour — makes it possible to go one step further. When the range of distinct colours has been exhausted, it is possible to add distinguishing signs, such as wide stripes of colour on the scale stub. The issuing station need no longer be shown, as it is indicated by the colour of the transfer. In the same way, it is no longer necessary to give the name of the route that is to be followed: the direction is sufficient. When this system was

introduced, in Toledo (U. S. A.), it was found that an increase of 8 % in the sale of tokens made good the losses incurred, from having rendered fraudulent return journeys impossible. At Des Moines, where the system was introduced in 1929, the total suppression of punching in one-man cars made it possible to increase the average speed from 9.5 to 11.5 miles an hour, an increase of 21 %.

(d) STUB WITH SCALE OF PLACES. — PUNCHING AND SEVERANCE WITH A CUTTER. — In March 1929, a system was tested, at St. Louis, which is, in fact, the reverse of the previous one, the hours and half hours being listed on the body of the ticket, and the trips from place to place on the detachable stub. At the same time a new type of cutter, the « Conover Au-

American paper transfers with indications by punching (Red. 3/4).

Fig. 861. — *N. C. T. Co., Everett* — Lists of months, days, hours and 20-minute periods — Special transfer for a given line — « S » Symbol — Fac-simile of Manager's signature — A. M. and P. M. hours, the latter in negative type.

Fig. 862. — *St. Louis Transit Co.* — Also bears list of lines — Special indication of hours and minutes, P. M. time in negative type — Form symbol.

Fig. 863. — *West Ridge Transportation Co.* — List of issuing and connecting lines, the latter printed in two kinds of type — Whichever side is perforated shows whether it is A. M. or P. M. — Ten-minute intervals shown opposite each round hour.

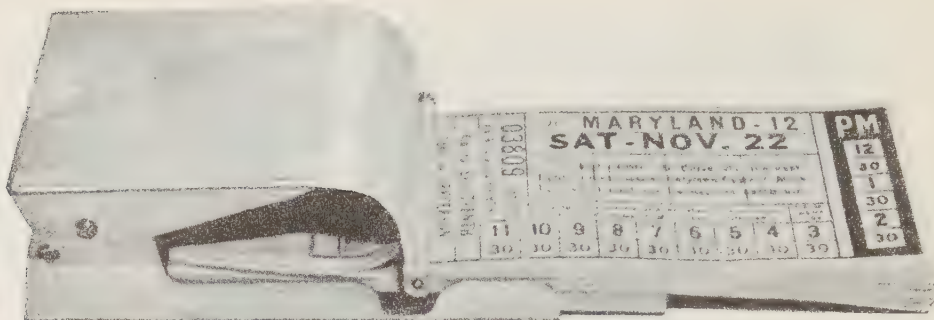


Fig. 864. — « Conover » transfer cutter — *St. Louis Tramways* — Scale of lines — Date and day clearly printed — Hours and half hours have to be punched.

tomatic routing transfer » was introduced (fig. 864).

The order in which the runs are listed has a definite purpose; it must not be possible to use the transfer as a return ticket by cutting off more of the stub.

(e) **CROSSED-SCALE STUBS.** — Punching factors in lists printed on the body of the ticket takes time, so this is where improvement was sought. We have seen how, by means of a simple type of cutter, one of the two factors only, hour or place, need be punched, the other being transferred to the stub.

This has been followed up even further and the two different kinds of punching dispensed with altogether thanks to the introduction of notch cutters (fig. 865) used in conjunction with a double entry table on the stubs; the horizontal (virtual) lines represent the hours and the columns, the routes (figs. 248 and 249). The factors in the columns may vary and list :

Issuing line, or more frequently line to be used subsequently (figs. 248, 866) ;

Direction of journey : « inbound » (fig. 249) or « outbound » or else « North » and « South ».

Part of the date, the month for example (fig. 250), as each ticket is overprinted with the day;

Zone, « to » and « from » — for systems with zonal rates;

Method of payment — in cash or by token.

When two categories of transfers are needed, for full-fare tram to bus, and half-fare tram to tram, for instance, a special cutter is used which notches transfers taken from the top or the bottom of the pad differently (figs. 251 and 252).

ADDITIONAL SPACES are left on certain transfers, which can be punched if required :

The « off route » space is used for vehicles from the depot or returning thereto (1). No line indication is added.

« Emergency » space, for unforeseen circumstances (2).

Other spaces show how the passenger obtained the transfer and specify that it was :

Exchanged for a school ticket (2) (multi-journey card) on payment of 2 cents;

Exchanged for another transfer (2) :

(1) *International Ry. Co.*, Buffalo.

(2) *Indianapolis*, Buffalo.

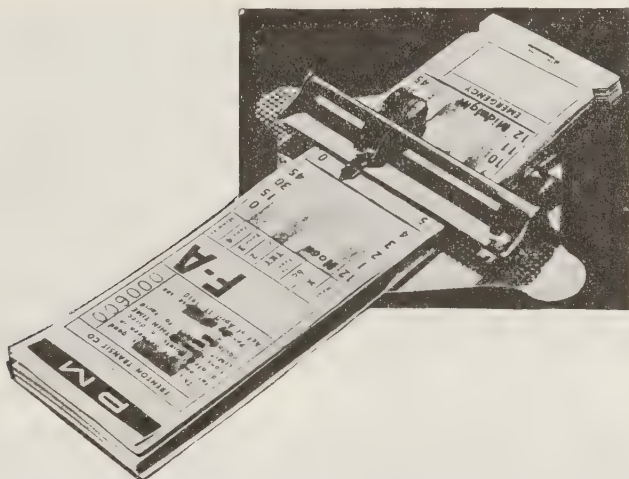


Fig. 865. — Transfer used in one of the *Globe Ticket Co.*'s notch perforation cutters — No punching — Stub with crossed scales : scale of hours and quarter hours, and various other indications (zone, etc.) — P. M. coupon.

Or else spaces worded ⁽¹⁾ :

« Special » — for unforeseen circumstances;

« Ball Park » — because on days of peak traffic cars from any other line can be used on the Ball Park line, and the colours of such transfers would not correspond.

CATEGORIES OF TRANSFERS. — Different transfers are issued according to the method of payment :

In cash;
By tokens;
By transfer.

Company's employees ⁽²⁾ are also issued transfers but they have to pay for them, even if they have travelled free on the first route.

Certain roads also have commutation transfers which are bought in booklets at a reduced price ⁽³⁾.

TRANSFERS FOR MORE THAN TWO JOURNEYS. — Transfers must enable the passenger to travel to destination no matter how many different lines are used, so long as these follow each other. Instead of 2, he may have to make use of 3 or 4 lines. The transfers in question are collected by the conductor of the last car. Intermediate conductors perforate a special revalidation space and hand the transfer back to the passenger.

Transfers with detachable coupons. — Certain transfers allowing lines belonging to the same Company (*fig. 190*) or to different Companies (*fig. 191*) to be used in succession are provided with control coupons. The conductor of the first car detaches the first of these coupons, and the successive conductors collect the others. There is no revalidation.

There are also « P. M. » coupons; if

(1) *International Ry. Co., Buffalo.*

(2) Differently coloured tickets are sometimes issued to employees in different Departments, for example :

Transportation ticket brown
Mechanical Dept. red.

Power Dept. blue.
Claim Dept. yellow.

(3) *Charleston Rapid Transit Co.*

AMERICAN CO. PRINTED & BINDER, MOBILE

11	10	9	8	7	6	5	4	3	2	1	12	HOUR	25	19	13	7	1	July	Jan.	
												Emerg'cy	26	20	14	8	2	Aug.	Feb.	
												WarmSpgs	27	21	15	9	3	Sept.	Mar.	
												No. 18th	BOISE STREET CAR COMPANY							
												No. 8th	Good for continuous passage only if presented on date issued and before latest time shown at established transfer point. This transfer is not good on any bus returning to the territory or route covered by the bus from which this transfer was first issued.							
												Depot	28	22	16	10	4	Oct.	Apr.	
												Fairview	29	23	17	11	5	Nov.	May	
												No. End	30	31	24	18	12	6	Dec.	June
												Collister								
												So. Boise								
												Bench								
												Refund								
15	30	45	15	30	45	15	30	45	15	30	45	MINUTES								

Issued From Bus Coming From:

6105 A.M. P.M.

Eastern Massachusetts St. Ry. Co.
This coupon makes attached
TRAFFIC CENTER EXTENSION, GREEN
AT FAIRVIEW AND GOOD
LOWELL CENTRAL
ZONE LIMITS
COURT HOUSE
ST. RY. CO.
GOOD FOR FARE TO
ANY LIMIT OF THE
Lowell Traffic Center
EXCEPT
COURT
HOUSE
FORM 137-B
C 445935
DATE
12 11 10 9
GOOD ONLY ON
TRAFFIC CENTER
EXTENSION
BEFORE TIME
PUNCHED
GOOD IN A.M.
MORNING ONLY
PUNCHED
HERE
★
2 3 4 5 6 7 8

American paper transfers (Red. 3/4).

Fig. 866. — Transfer for use with special cutter — *Boise Street Car Co.* — The month and day have to be punched, as also A. M. or P. M. space — Scale of hours and quarter hours — Line and refund, if any, shown by punching — P. M. in negative type — Heavy bands in alternate columns.

Fig. 867. — Old transfer with stub, *Eastern Massachusetts St. Ry. Co.* — The text on the stub was in negative type — List of hours — Date represented by a symbol (« H » in this case).

these are left on the transfer it means that it was issued in the afternoon, but if they are removed, in the morning.

CHAPTER XXIV.

REDUCED FARES.

We do not intend going into the question of cheap fares. These are granted in order to encourage the public to travel. The Companies' attitude in this con-

nection is based on the ordinary commercial principle of selling larger quantities cheaper, with the difference of course that they sell large quantities of tickets to a number of different persons, and also, but less frequently, to certain groups of passengers. In other cases, they endeavour to lessen the deficit on certain services worked for little profit or at a loss by selling particularly cheap tickets.

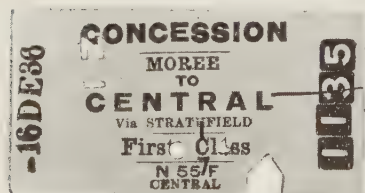
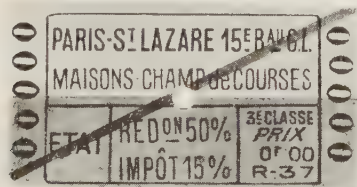
This shows why a multitude of special

rates which have been introduced, all have to be represented by special tickets. Two different principles are involved :

(a) The same reduced fare tickets are issued to all holders, whatever the reason it is granted to them.

(b) Different tickets are introduced for each category of passenger, even if several categories enjoy the same reduction. This system is obviously objectionable from a ticketing point of view, and can only be defended on the plea of statistical or accountancy requirements.

The first system rules in Belgium, the second, on the British Metropolitan and overseas Railways.



Cheap fare Edmondson tickets (Red. 4/5).

Fig. 868. — Indication of the percentage of reduction and taxation — French State Rys. — Bicoloured as were all French half-fare tickets.

Fig. 869. — New South Wales Govt. Rys. concession ticket — Date stamped.

Attempts have been made to reduce the number of different kinds of tickets by using the same ticket in the first case, for several rates granting different re-

ductions on the full fare, and in the second, for several different categories of passengers grouped on the same tickets.

DIFFERENT PERCENTAGES OF REDUCTION. — For reasons outside our subject, various percentages of reductions are granted. The tickets can show these exclusively or inclusively, i.e. they may show a fraction of the full fare, or on the contrary state the percentage of reduction on the usual fare, from which it is possible to calculate by subtraction how much of the full fare they represent.

In either case the percentage of reduction is not always indicated. Cheap tickets frequently issued, in England, formerly in Belgium (fig. 875), and still in the United States (« reduced fare tickets ») (fig. 15), do not specify the percentage of the reduction.

« Concession tickets » are also to be found in England and Australia (fig. 869); they are similar to the French « bil-

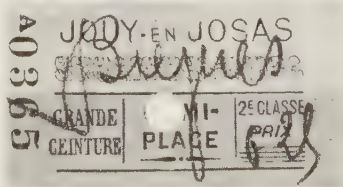
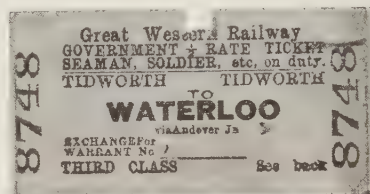
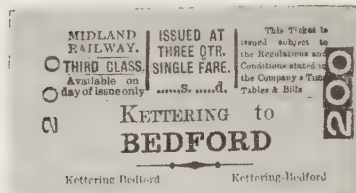
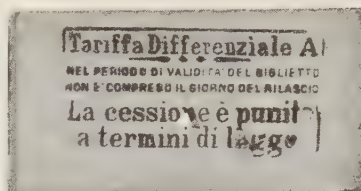
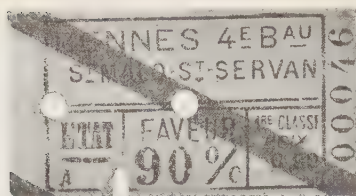


Fig. 870. — Single semi-blank ticket with safety grid consisting of the interlaced initials of the *Chemin de fer de Grande Ceinture* (Paris) — About 1905 — Category : half fare (Red. 4/5).

lets de faveur » (fig. 871), a name no longer used since it seemed rather derogatory. The British « privilege tickets » issued to railway officials and employees are based on the same idea.

In France, tickets are issued at three-quarters, half, or one-quarter fare. Similar reductions are granted in other



Edmondson tickets (Red. 4/5).

Fig. 871. — Privilege ticket with 90 % reduction. — French State Rys. (1905).

Fig. 872. — Ticket issued at 3/4 single fare — Midland Ry. — Number repeated on both halves.

Fig. 873. — Differential tariff ticket — Italian State Rys.

Fig. 874. — Ticket issued against a warrant to seamen or soldiers on duty at Government half rate — Great Western Ry.

countries (fig. 615) ⁽¹⁾, and various Edmondson tickets show them in various ways. The French half-fare tickets are bicoloured parallel with the long side (figs. 835-868), and the quarter-fare tickets diagonally bicoloured ⁽²⁾. Elsewhere, a simple central or diagonal line answered the same purpose (fig. 76).

One of the colours was yellow, and the other, the travel class colour. Yellow was given up after a time, and that part of the ticket left white, so that only the second colour had to be printed. Some Companies print the class colour on the left, and others on the right, according

to the direction; on certain others, this reversal of the order is due to the technical process of manufacturing the tickets. The French way of differentiating between half and quarter-fare by longitudinal or diagonal division of bicoloured tickets has been modified in the case of tickets printed (necessarily) in one colour at the moment of issue. Black hatching replaces one of the colours in the case of tickets printed by the « Controller » machines (figs. 660 to 663), and a heavy oblique or vertical line those issued by the A. E. G. machines (figs. 702-701).

(1) In Switzerland and in Spain.

(2) The diagonal division is sometimes extended over the whole of a return ticket, sometimes it is repeated on each half (fig. 591) even if these are for different classes (fig. 785). On the P. L. M. the arrangement of the colours is identical on each portion of the ticket; it is sometimes reversed on the two parts of a return ticket on the French Est Railway (France), so that only the two outside portions are coloured (fig. 591).

In Central Europe, the diagonal division is made on the lower half of vertical coupons only (Austria, Hungary, Czechoslovakia).

A separate colour may be used for each of the three portions of blank three-part Edmondson tickets (fig. 590).

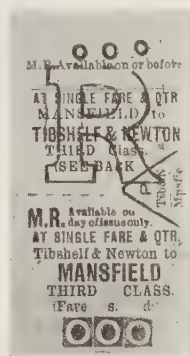
Though reserved in principle for non-dividable tickets, such divisions are often indicated on bi-coloured two-portion tickets.

In the States, half-fare tickets are printed on blank cards pre-printed in red or occasionally in blue, with the fraction « $1/2$ » in large figures (*fig. 80*); this is also to be found on single or return paper tickets (*fig. 150*) but rarely on « band tickets » where it is more usual to clip a space marked « $1/2$ price » if the ticket is sold for this amount (*figs. 514, 960*).

The so-called Belgian system allows the same Edmondson tickets to be used at full- or half-fare, thereby halving the number of different tickets required. The principle consists in issuing the whole ticket for full fare and only half the ticket when it is sold for half-fare, the other part being retained for auditing purposes. This necessitates a special arrangement of the letterpress which has to be repeated together with all the factors relating to the journey, geographical data, date, serial number, full and reduced fare, on both halves of the ticket. The half fare may be exactly half the full fare, or a fraction higher. It is unnecessary, with this system, to print or issue special half price tickets, or to modify the ticket in any way at the time of issue as with the English system.

These tickets are issued to all passengers entitled to a 50 % reduction, children, and military not qualified for $1/4$ fare. In order to specify the categories, when needful, a hand stamped initial is added. It is also possible subsequently to issue the second half of the ticket to an-

other passenger. In addition, on railways where no reductions are granted on return tickets, one of these single tickets can be issued to a soldier or a child as a return ticket, on stamping it with the word « return » on either of the two halves.



Cheap Edmondson tickets (Red. $4/5$).

Fig. 875. — Old Belgian State Rys. ticket (1865).

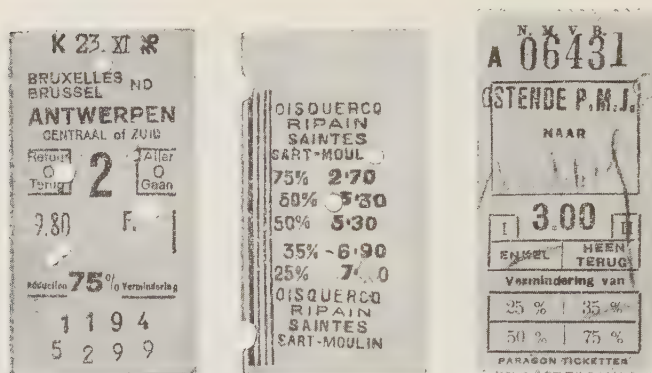
Fig. 876. — Return ticket at single fare and $1/4$ — Midland Ry. — With triangular stub to be punched out when issued to a child.

One of these tickets is shown in *fig. 776* and others issued by the Austrian *North Western Ry.* in *fig. 775b*, the *Südbahn* in *fig. 201* and the Dutch railways in *fig. 694*; all apply the same system.

Similar cheap fares are in operation in England but the fractional rates are more complicated. Besides single tickets at $1/3$, $1/2$, $2/3$ and $3/4$ of the full fare (*figs. 261, 872-874*) ⁽¹⁾, return tickets are issued at the ordinary single fare or $1\ 1/4$, $1\ 1/2$ or $1\ 3/4$ the usual fare (*fig. 876*) ⁽²⁾.

⁽¹⁾ On the former *Midland Ry.* and the *L. M. S. Ry.*

⁽²⁾ The *New South Wales Government Rys.* issue $3/4$ fare tickets (apprentices), $1/2$ fare (children and scholars) and $1/4$ fare (also to scholars) without counting the free tickets issued to students at the free schools.



Edmondson tickets with percentage reductions (Red. 4/5).

Fig. 877. — One-piece return ticket printed by the A. E. G. « Rapid Printers » — Belgian National Rys. Co. — Double serial numbering — 75 % reduction.

Fig. 878. — Back of an Edmondson pre-printed scheme ticket — With vertical grid for an possible extra destination — Same Company as fig. 877 — Various percentages of reductions listed with the corresponding fares.

Fig. 879. — Semi-blank ticket from a soft carton reel — Fixed value and various alternative reductions — Belgian National Light Rys. Co. — Category : single or return.

For some time past, ever more reductions have been granted and this has led to a harmful complication which has been remedied to some extent through expressing them in percentages of the full fare. Belgium, for instance, has tickets with 25, 35, 50 or 75 % reduction ⁽¹⁾ (fig. 877), and France with reductions of from 25 to 90 %, the latter granted to workmen for holidays with pay ⁽²⁾ or war disabled or members of a large family.

REDUCING THE NUMBER OF DIFFERENT

CHEAP TICKETS. — Tickets with cheap-fare stubs showing the different kinds of reductions granted, and the corresponding fares have been introduced in Belgium. When they are severed between two consecutive percentages, the passenger is issued a cheap ticket, and the booking clerk retains the stub for accountancy purposes (fig. 231).

In view of the likelihood of further reductions, recent tickets have been printed with a « grid » in which to possibly write these and the corresponding fares (fig. 878).

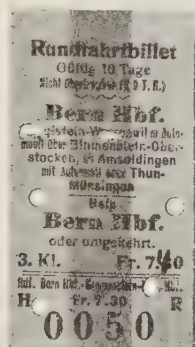
(1) These reductions are granted as follows :

- 25 % to officers on the reserve, gendarmes, etc.;
- 35 % to groups or parties of at least 15 persons, to delegates to Congresses, etc.;
- 50 % to groups of at least 25 persons, to children between 4 and 10 years of age, to officers on leave, to nurses, etc.;
- 75 % to military, ex-service men, professional journalists, unemployed looking for work, etc.

A 30 % reduction is also granted to members of large families on the Frontier-Haze-brouck section.

(2) 50 or 75 % according to the degree of disablement; to members of large families; a 70 % reduction is granted in Italy, 60 % in Germany and 75 % in Austria.

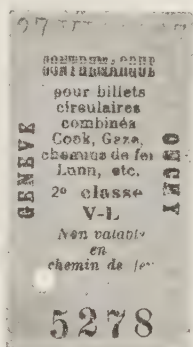
The *Belgian National Light Rys. Co.*'s soft card single or return tickets have tables showing the reductions in force, on which the conductor indicates the reduction applying, in coloured pencil or by perforation (fig. 879).



Edmondson tickets for circular tours
(Red. 4/5).

Fig. 880. — *Swiss Federal Rys.* ticket, showing the route.

Fig. 881. — Exchange ticket for ticket issued by an agency — *Compagnie Genevoise de Navigation à vapeur.*



We have already seen that paper coupons generally have a triangular stub in the top corner which is removed when the ticket is issued at a lower rate to a child (fig. 92). They can also be made so that the same coupon may be used for different percentages by providing them with stubs at the upper and lower right hand corners, the removal of which means that the coupon has been sold at a reduction of 25 or 50 % respectively ⁽¹⁾.

VARIOUS FARE REDUCTIONS are granted and in order to put a certain amount of order into this subject we will group them as follows :

1. Reductions applying to the journey itself:

2. Reductions for some professional reason;
3. Reductions for family reasons or for children;
4. Restricted reductions (limited to certain categories of passengers).

Any other classification covering all the different kinds of tickets would do just as well; the essential point is to have some sort of classification, as this is the only way of making an orderly investigation. It may be stated at once — and we cannot insist too strongly on this point — that the number of separate categories for which different tickets are issued is unnecessarily high. It would be advisable :

(a) To group the categories so as only to issue a single kind of ticket for each group of cheap fares, instead of different tickets for each category. Each such group would cover all the tickets issued under the same conditions;

(b) Only to issue special tickets for a given category of a group when special statistics are required. An issue of this kind could even be only temporary, as for example in Belgium, where in order to settle an account with the State, the cards used for tickets were over-printed in advance with a distinctive sign in red :

- I For War disabled;
- + For « Croix du feu », etc.;
- F For members of large families;
- X For ex-service men (fig. 892);
- M For soldiers on active service;
- A For other cheap fares.

In order to distinguish between certain categories of passengers, Edmondson cards of special colours are used for certain services, the same colour for both 2nd and 3rd-class travel :

- Grey for disabled ex-service men;
- Orange for « Croix du feu », etc.

(1) The *Congo Light Rys. Co.* (Uélé lines).

Pink	for members of large families;
Lake	for ex-service men;
Blue	for soldiers on active service.

Apart from the case we have just mentioned, it does not seem advisable to have different tickets for passengers benefiting by the same rate reductions. But since unfortunately this is not the case in practice, we must rapidly review the different categories in existence. For this purpose we have grouped them according to a decimal classification :

1. — REDUCTIONS APPLYING TO THE JOURNEY ITSELF.

1. 1. — Circular tickets.
1. 2. — « Combinable » tickets.
1. 3. — Cheap tickets issued to any passenger.
1. 4. — Excursion tickets.
1. 5. — Regional reductions.
1. 6. — Tickets for slack periods.

2. — REDUCTIONS GRANTED ON PROFESSIONAL GROUNDS.

2. 1. — Soldiers, sailors and correlated.
2. 2. — Employees of other public services.
2. 3. — Professors, students, and scholars.
2. 4. — Other intellectual professions.
2. 5. — Traders.
2. 6. — Manual trades.
2. 7. — Company's employees.

3. — REDUCTIONS FOR FAMILY REASONS.

3. 1. — Different members of a family.
3. 2. — Children.

4. — RESTRICTED REDUCTIONS (LIMITED TO CERTAIN CATEGORIES OF PASSENGERS).

4. 1. — Collective tickets.
4. 2. — Tickets for events drawing big crowds.
4. 3. — Sports tickets.
4. 4. — Tickets of a charitable nature.
4. 5. — Temporary cheap fares.
4. 6. — Tickets for certain trains.
4. 7. — Various cheap fares.

1. — Reductions applying to the actual journey.

1. 1. — So called « circular » tickets cover one or several railway systems in the same country. They are to some extent return tickets, the homeward journey being made by a different route to the outward, and profiting in spite of this by some reduction on the ordinary fare.

They may extend to journeys made partly by sea ⁽¹⁾ (fig. 884) or inland waterways ⁽²⁾, or comprising motor coach runs ⁽³⁾ or air travel. They are issued by railway companies carrying the passenger to the change-over point or more rarely, by tramway companies ⁽⁴⁾. On certain sections, the passenger has a choice of route or even of method of transport. The holders of circular tickets frequently benefit by reductions on lines joining or branching off those followed by the tour. Such reductions are granted on showing the ticket or on collection of a special coupon with which it may be provided for the purpose (fig. 111).

Each system issues a certain number of circular tickets over fixed itineraries. These are often made up into booklets

(1) « Tour of the Isle of Wight » (*Southern Ry.*); these tickets include admission to the pier.

Cruise from Paris to Bordeaux by rail (*P. O.*), Bordeaux to Dunkirk by boat, and back to Paris by the *Nord Ry.*

Ocean cruises of the *London and North Eastern Ry.*

(2) *Compagnie Genevoise de Navigation*; « Tour of Haut-Lac », etc.

(3) Tour of the Ardennes (*Belgian National Rys. Co.*); the Châteaux of the Loire (*P. O. Ry.*).

(4) Tours of the *Bristol Tramways*, and those of *Rothsay* (« Round Bute »), *Birkenhead*, and *Blackpool* (fig. 882). These tickets are clipped on each section of the journey, a special space being provided in each case.

with detachable coupons (Belgium); in Switzerland they used to be thick cards which were clipped at each section of the journey; more recently, Edmondson tickets have been substituted (fig. 880), and divided, if need be, into three coupons (fig. 884). In many cases, counter-marks are issued in exchange (fig. 881).

Circular journeys may be broken. If they start from the frontier, the return journey need not necessarily end at the starting place ⁽¹⁾.

Part of the itinerary may be covered on foot. The London *Metropolitan Ry.*, which originated this idea, arranged some fifteen rambling tours.

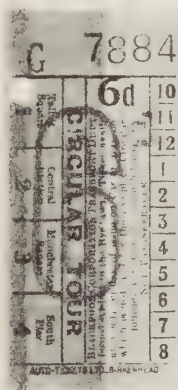
1. 2. — « Combinable tickets ». — As it is impossible to foresee all possible combinations of journeys, circular tickets are made up of coupons meeting any of the passenger's requirements. For this

purpose the *International Union for the Issue of Combined Tickets*, with headquarters in Brussels, has numbered each section of all the lines on all the railway or steamship systems where such tickets are available, and the various Companies belonging to the Union have printed coupons for each of them. These coupons are usually 15 % cheaper than ordinary single tickets but special rebates are frequently awarded ⁽²⁾. Blank coupons are also provided for use instead of missing printed ones.

Coupons are also issued for several consecutive sections on the lines of a single Company. We have previously seen how these coupons are made up into booklets with the *Union's* standard cover (fig. 535). The German *Verein* has similar tickets (fig. 91). When necessary, these Associations alter the general regulations and clauses affecting the issue or use of the tickets.

1. 3. — Cheap tickets issued to all passengers. — This category should be headed by return tickets issued to get the public to travel during slack periods so as to meet the competition of other services, or to attract certain kinds of traffic, such as workmen on holidays with pay. Single cheap tickets have also been issued for the same reasons.

The period of validity of return tickets varies from half a day to one or several months. It is sometimes shown by skeleton type, corresponding to the number of days the ticket is valid. Edmondson tickets differing only in period of validity are identical save for this overprinting and the price which varies accordingly.



Road transport soft card tickets for circular tours (Red. 4/5).

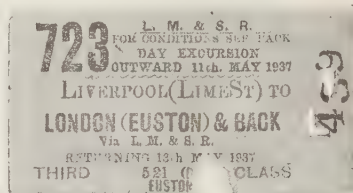
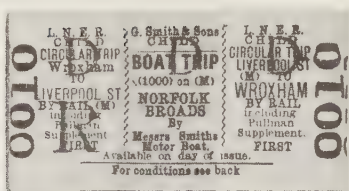
Fig. 882. — Blackpool Corporation Transport Dept. — With spaces to be punched by successive conductors.

Fig. 883. — Brighton Corporation Tramways — Ticket for tourist car.



(1) The *Italian Railways*, who originated such tours, organise a great many every year.

(2) 60 % for transit through Germany; 50 or 70 % according to class for foreign travellers through Italy.



Edmondson excursion tickets (Red. 4/5).

Fig. 884. — Three-portion ticket for a circular tour including a section by boat — L. N. E. R. and G. Smith and Son — The railway portions of the journey include a Pullman supplement — Category : Child — Initial « D » surcharged to show that it is valid for the day of issue only.

Fig. 885. — *Tralee and Dingle Ry.* — Special mark used for excursion tickets.

Fig. 886. — Return excursion ticket for the Coronation — With date and number of special train — L. M. S. Ry.

Fig. 887. — *Cork, Bandon and South Coast Ry. (Eire)* — Return ticket — Name of issuing station and of outward journey omitted — Date stamped.

The category of special return tickets is frequently indicated by a letter, as :

- A « C » for cheap returns;
- An « M » for monthly tickets;
- An « S » for summer tickets, valid for 30 days (fig. 592);
- An « L » for long-period returns.

Similar tickets are used by road transport (fig. 889).

Excursion return tickets and those only valid at certain hours of the day will be dealt with below.

1. 4. — Excursion tickets. — There are various categories of excursion tickets which are issued either to all or only to certain passengers. In both cases, as they carry pecuniary advantages,

they also entail certain restrictions. When good over the whole system, they are only valid on certain dates or by certain trains. If honoured on all trains, they are generally only available for certain districts.

Excursion tickets are issued both to clubs or parties and to the general public.

Excursions organised by agencies date back to 1841. Figure 178 shows one of the earliest of Cook's tickets issued by the *Midland Ry.* For a long time this agency, then Messrs. Gaze and later Messrs. Lunn were the only agencies with permanent agreements with certain Railways, such as the Swiss Companies (fig. 881).

The first English excursions were ma-



Soft card road tickets (Red. 4/5).
Fare stages with heavy type initials.

Fig. 888. — Cheap ticket for slack periods —
L. G. O. and Associated Cos. — Surcharged
with special mark and the value in skeleton
cipher.

Fig. 889. — Fixed-value cheap return ticket
— *London Passenger Transport Board* trolleybus — Colour intensified by cross hatching
to distinguish it from an ordinary
ticket.

Fig. 890. — Same Company's tram services
— Ticket for a one- or two-car journey —
With distinctive marking.

de in open carriages but, in order to attract a greater number of passengers, a greater degree of comfort was offered and certain excursion tickets stated between 1865 and 1875 :

« In covered carriage » (fig. 776b).

« In closed carriage » (fig. 774).

In those days, this was a novelty.

The Companies frequently issue excursion tickets « by special arrangement » for which they use blank or fixed-destination tickets (fig. 587).

Excursion tickets are widely used and very popular in England, where the following categories of Edmondson tickets are issued :

Half-day excursion;

Day excursion, often designated by the letter « D ». Single or return tickets.

Cheap day excursion.

Excursion booklets from England to the Continent and vice-versa are valid for periods of 15 or 17 days.

In addition to tickets valid on most of the trains, others are issued requiring the holders to travel by a given train, especially in the case of special excursions, such as the excursions organised in connection with the Coronation (fig. 886), the *Midland and Great Western Ry.* (Eire) tickets, valid as far as the « temporary halt » of Fairy House Bridge (fig. 185), or those of the *South African Rys.* valid as far as

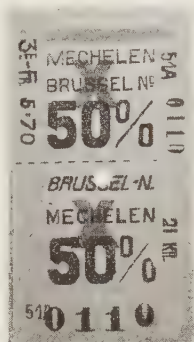
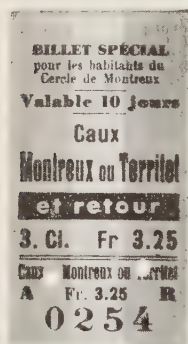
« A point situated 76 1/2 miles along the main line » (fig. 920).

Similar excursions are naturally less frequent by road, where they are run in special cars (fig. 883).

1. 5. — **Regional reductions** are granted to the inhabitants of a given district served by railway, or on the contrary to passengers travelling into a district which it is desired to boost.

Funicular or rack railways and even adhesion lines in mountainous country have sometimes been costly to build and this has obliged them to charge high rates in order to get a return on capital. Tourists are able to pay these high rates since they use each line but little, but

this does not apply to the inhabitants of the district, who travel by them daily. This they could not afford to do were they not granted special reductions. Cheap tickets « for the inhabitants of the district » are therefore issued to them on presentation of a document proving they live in the district (fig. 891).



Edmondson tickets (Red. 4/5).

Fig. 891. — Special return ticket for inhabitants of the district — *Territet-Glion-Naye* (mountain) *Ry.* — Return in negative type.

Fig. 892. — 50 per cent reduction return ticket now printed in one language only — Clear ticket due to part of the text, distance, class, fare, number and series being arranged laterally — Category : X, (Ex-servicemen).

On the other hand, in order to get the public to travel over certain lines, special reductions are granted for slack periods or hours which suit the Company. They are not necessarily of the same sort; they may be selected either on account of the beautiful scenery they run through, or as leading to holiday resorts, winter sports, mountaineering districts and so on.

Holiday tickets started the idea, then came seaside tickets ⁽¹⁾ and more recent-

ly, tickets for sports grounds, winter sports, etc. ⁽²⁾.

1. 6. — **Slack hours.** — Instead of taking the distance covered into account these tickets seek to promote traffic during slack hours. The British Railways, for example, issue the following Edmondson tickets :

Mid-day cheap;
Early closing;
Evening cheap;
Shopping tickets;
Evening tickets.

To these must be added tickets for markets and fairs, which are widely used on many lines, and even theatre tickets, to get suburban and provincial passengers to travel in the slack evening periods.

These various kinds of tickets are also issued for through trips over main-line and urban railways (fig. 880).

Cheap mid-day fares have been introduced for the benefit of employees who work away from home to enable them to go back for lunch.

ROAD TRANSPORT also issue cheap tickets during slack hours either to all or only to certain categories of passengers. Their special validity is indicated on the fixed price tickets.

In London, cheap mid-day fares are either shown on special tickets or added to the list of normal services. They are sometimes followed by a list of other journeys which can be made at reduced fares during working hours only (fig. 888-890).

Cheap return tickets of all categories

(1) Introduced in France in 1937.

In Germany, tickets for the Baltic. Sea breeze trips on the *Great Southern Rys.*, Eire. Many French Edmondson tickets have three coupons, the centre one giving access to the beach, or other enclosures.

(2) In France, Austria and Switzerland.



Edmondson tickets for military (Red, 4/5).

Fig. 893. — Old *Belgian State Rys.* ticket (in the fifties) — Surcharged with capital « M » (Military).

Fig. 894. — Soft card ticket, *Paris Métropolitain* — Valid during the War — Very badly printed safety background.

Fig. 895. — Return ticket for British soldiers in Germany — *Belgian State Rys.*

Fig. 896. — Return scheme ticket with 75 % reduction for maimed — *Paris-Orléans Ry.*

are generally available in one direction at certain hours of the day only, in order to increase the traffic at these times. The return journey is included in the usual traffic ⁽¹⁾.

American Companies have been at pains to increase their slack hour traffic and have resorted to various means for the purpose. The *Baltimore Transit Co.*, for example, since the 1st January 1937 has issued two-trip slips free to full fare passengers. If the return takes place between 9 a.m. and 4 p.m. only half the fare is charged provided this slip is handed in. This was therefore a conditional reduction only in operation at slack periods.

We have already mentioned the shopper's tickets devised by the Hon. Henry W. KIEL, former Mayor of St. Louis, and

City Transport Receiver, in order to make better use of the vehicles during the slack period between 10 a.m. and 4 p.m. ⁽²⁾. As from the 10th July, 1935, he issued single tickets valid without additional payment for the return journey. Passengers could also obtain free transfers in both directions. Even making allowance for those who changed the hours at which they travelled in order to obtain these facilities, a substantially increased traffic was recorded. As a result shopper's seasons which could only be used at the same time as the tickets mentioned above were also introduced.

The special concession passes are based on an opposite idea. They give free transport on the outward trip, the passenger only having to pay for the inward one. These special tickets are issued by

(1) In England some of these tickets are only valid after 10 a. m. on week days, and all day on Sundays.

The cheap fares are in operation from 9.30 a. m. Monday to 4 p. m. Friday inclusive. In *Bradford* all passengers travel at the cheap fares up to 9 a. m.

(2) See *Bulletin*, July 1938, p. 672 (136).

agreement with large business or entertainment firms who pay the Company a reduced fare for the original trips.

2. — Reductions on professional grounds.

Special reductions are granted to those following various professions, and most generally apply to military and workmen. But there are so many others that it is essential to group them; little comment will be required, thereby avoiding having to unduly extend this chapter.

Edmondson tickets are mostly used, but cards and paper tickets are to be met with, particularly in America. In Europe the latter are used for many purposes, and include various reductions, the amount and reason being shown.

We will review them succinctly in the following order :

2. 1. — Military, naval, and correlated;
2. 2. — Employees of other public services;
2. 3. — Professors and students;
2. 4. — Other intellectual professions;
2. 5. — Traders.
2. 6. — Manual workers;
2. 7. — Company's employees.

British Railway Companies (at home and overseas) are the chief offenders in issuing too many different categories of tickets. In America, the number of different kinds is relatively small ⁽¹⁾.

2. 1. — Tickets for soldiers, sailors and the like. — These tickets are issued to those entitled to them either when in uniform, or on showing an identity card, or against a warrant. Though the same benefits are granted to both the army and navy, certain railways issued different tickets for them. More recently, they issued tickets available for either, and at

the present time, they are all grouped together as tickets for H. M.'s Forces. Different tickets are still issued to those on service and on leave, as the reduction varies in each case. In addition, the police and similar bodies enjoy the same advantages, when in uniform or upon production of an identity card or badge (*fig. 467*).

The variations most frequently found with single or return Edmondson tickets are listed below. We will begin with tickets for those travelling while on active service :

Military (figs. 893-895);
 Defence Force, *New Zealand Govt. Rys.*;
 His Majesty's Forces on duty — This now includes all services:
 Soldier on warrant (Ireland);
 Soldier on duty;
 Sailor on duty;
 Naval or police on duty;
 Seaman, soldier, etc., on duty.
 Soldier on active service or on leave (Belgium);
 Officer, *Midland Ry.* (*fig. 261*);
 Officer or private, France;
 Staff officer, England;
 Reservist called up, France.

The following Edmondson tickets are or were issued to military on leave :

Soldiers on leave;
 Officer on leave, *Southern Ry., Great Western Ry.* (*fig. 898*);
 Military and naval on furlough, *L. M. S.*;
 Military, etc., on furlough *L. N. E. Ry.*;
 His Majesty's Forces on leave.

It is curious to note the large variety of tickets for sailors, in addition to the above :

Merchant seaman, *Midland Ry.*;
 Mercantile marine, on leave;

(1) Merely including tickets of various sorts for members of a government department, commercial travellers, workmen and clergy; the others are exceptions.

Training ship boy, *G. W. R.*;
 Friend of training ship boy, *North British Ry.*;
 Ship's crew, *Great Western, Southern.*

When the concession deeds of the Road Companies require them to carry soldiers at reduced fares, special tickets are issued: at Bordeaux, tickets for non-commissioned officers and privates, elsewhere for officers (Bradford); at Damascus for « civilians or military » with a table of the fares applying to each of the two categories.

In addition to these regular tickets, the Railway Companies grant special reductions to certain categories:

A given regiment (1);
 Maimed (fig. 896);

War disabled, according to the degree of disablement (fig. 466);
 « Croix du feu »;
 Ex-service men (fig. 892).

And during the War:

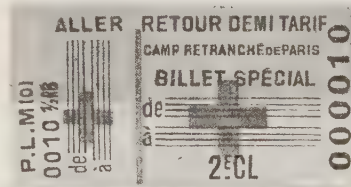
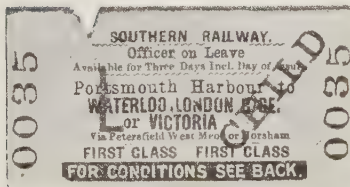
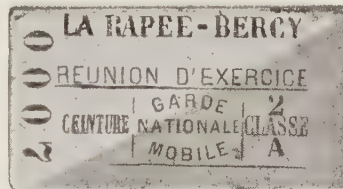
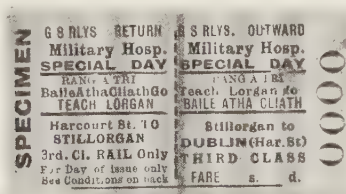
Paris Fortified Area (fig. 900);
 Tickets valid for the hostilities period (fig. 894);
 Tickets for occupied territory (figs. 78-418).

Also tickets for charitable institutions:

Ambulance tickets;
 Military hospital (fig. 897);
 Visit to a new ambulance train;
 Tickets for light meals offered at reduced prices to soldiers or sailors on active service (fig. 901).

For territorials:

Training meetings of the French National



Edmondson tickets for soldiers (Red. 4/5).

Fig. 897. — Bilingual return ticket for a visit to a military hospital — *Great Southern Rys.*, *Eire* — Special colouring.

Fig. 898. — Ticket for a member of officer on leave's family — *Southern Ry.* — Surcharged with an « L » to show the category « leave » and the word « child » — « For conditions see back » slogan.

Fig. 899. — Ticket for training of the obsolete National Guard — *Ceinture Ry.*, *Paris*.

Fig. 900. — Special blank return ticket of the Paris Fortified Area for a member of the Red Cross — Issued during the War — *P. L. M. Ry.*

(1) The Fifth Regiment, for example (*Bex-Gryon-Villars Ry.*);
 The 2nd London Rifles (*London and South Western Ry.*);
 The Hon. Artillery Company (*London, Brighton and South Coast Ry.*).

Guard (long since disbanded), *Ceinture Ry.*, Paris (fig. 899);

Volunteers in uniform, *S. E. Ry.*;
Territorials.

The *Midland Ry.* and the *North Eastern Ry.* had tickets adorned with a vignette (fig. 261).

In addition to the usual term « military » or « military rate », tickets for soldiers on the French railways are distinguished by diagonally divided two-colour printing :

Single tickets, figs. 170 and 456,

Return tickets in two halves, figs. 591 and 785.

Return tickets with three portions (fig. 590).

Machine tickets are distinguished by special signs (figs. 660 and 702) and those of other countries by various indications (fig. 533). Field railway tickets are generally paper ones (fig. 537), often printed on scrap paper.

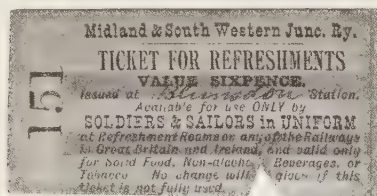


Fig. 901. — Edmondson refreshment 6-d. ticket, excluding alcoholic drinks, issued during the War - *Midland and South Western Jn. Ry.* — Category : Soldiers or sailors in uniform (Red. 4/5).

2. 2. — Reduced fares for employees of other public services. — Police generally enjoy the same reduced fares as soldiers, and are either issued the same Ed-

mondson tickets as the military (see above), or else special tickets :

Police, in Rhodesia (fig. 904), and *Great Southern Rys.*, Eire;

Garda on duty (the garda were special Irish police);

Police on duty, or on leave;

Judicial police officials (public prosecutor's department), in Belgium (fig. 905);

as well as various paper tickets :

« Gendarmerie » and « prisoners » in Belgium and France;

« Cuerpo di carabineros », in Chili ⁽¹⁾.

In America, paper tickets of a more general nature are utilised, labelled :

« Govt. Services », in the United States;

« Civil Service » in Canada;

« Government Employee », in South America;

Political or ecclesiastical Govt ⁽²⁾;

Bolivian State transport ⁽³⁾.

Besides these, special tickets such as « sheriffs » tickets ⁽⁴⁾ and others are issued on occasion.

2. 3. — Tickets for professors and students. — While there are special tickets for students of all ages everywhere, those for professors are exceptional. « Teacher tickets » are to be found, however, in Newfoundland and existed formerly in Ireland.

Students and scholars are generally issued season or multi-journey tickets but ordinary single or return tickets are used as well (fig. 159). In New South Wales, they are issued half or quarter-fare tickets and even free tickets when they attend the free schools. As most of them live in towns or suburbs, they frequently ride in urban cars, so these tickets are

⁽¹⁾ *Anglo-Chilian Consolidated Nitrate Co.*

⁽²⁾ *Arica and La Paz Ry.*

⁽³⁾ *The Congo Ry. Co.*

⁽⁴⁾ *Chicago, Rock Island and Pacific.*



Fig. 902. — Category : mercantile — L. N. E. Ry.

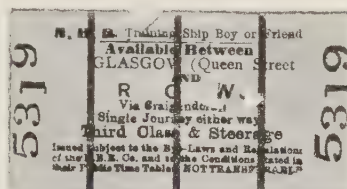


Fig. 903. — Ticket for training ship boy or friend — North British Ry.

more generally issued by TRANSPORT COMPANIES.

In England, the list of sections over which ordinary passengers may travel is frequently followed by a list of longer ones which scholars (and sometimes workers) can travel over for the same fare (fig. 890). In certain cases, this special availability only applies to certain hours of the day ⁽¹⁾.

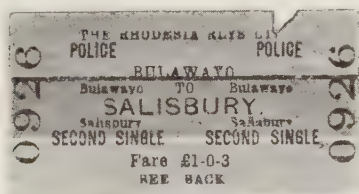


Fig. 904. — Edmondson ticket — The Rhodesian Rys., Ltd. — Category : Police (Red. 4/5).

Special tickets are issued elsewhere for all reduced rates and this comprises children and also dogs and luggage ⁽²⁾.

It may be added that in London there are tickets for « pupils », and others for « guides » (fig. 906). Special tickets were formerly issued to teachers in Ireland when their pupils were over 16 years

of age, and to governesses, if their pupils were under 16.

Special tickets are also issued for re-creative travel :

- For boy scouts, both children and adults;
- For girl guides;
- For juvenile camping parties ⁽³⁾.

It may be recalled, finally, that certain Companies sell packets of tickets which are exchanged for countermarks at the

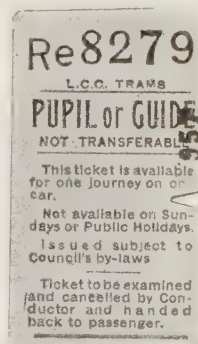
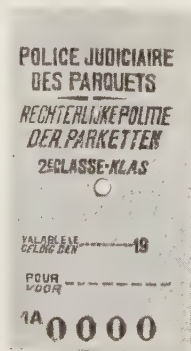


Fig. 905. — Bilingual blank Edmondson ticket, Belgian State Rys. — Category : Judicial Police Officials (Red. 4/5).

Fig. 906. — Soft card ticket, London County Council Tramways — Category : Pupil or guide (Red. 4/5).

(1) In London; at Hastings, from 8 a. m. to 7 p. m.

(2) At Walsall.

(3) Under 16 on the Mersey Ry.

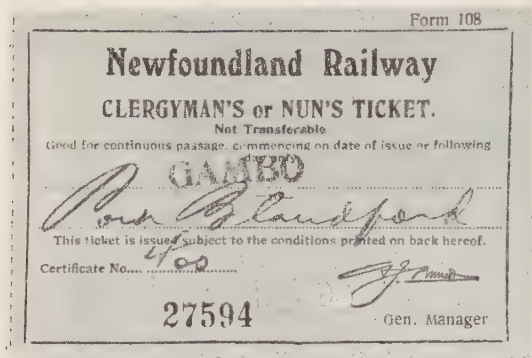


Fig. 907. — Thin card blank ticket — Newfoundland Ry. — Category : Clergy or nun — Issued on identity certificate (Red. 3/4).

moment of use ⁽¹⁾. This is similar to the American method, though the form is different : these packets of tokens are sold at reduced rates, enabling scholars and students to pay for their seats or buy transfers cheaper than if paid for in money. This method is used not only by scholars but also by pupils at the professional schools for whom special tickets are issued ⁽²⁾.

2. 4. — Tickets for members of other intellectual professions. — Two kinds of tickets only used in different countries come under this heading; one for members of religious callings, the other, for artists.

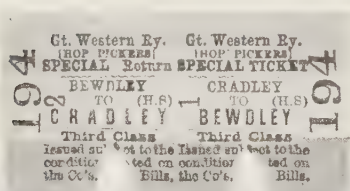


Fig. 908. — Hop picker's return ticket — Great Western Ry. — Parts numbered « 1 » and « 2 ».

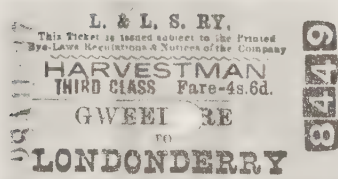


Fig. 909. — Harvestman's ticket — Londonderry and Lough Swilly Ry., Ireland.

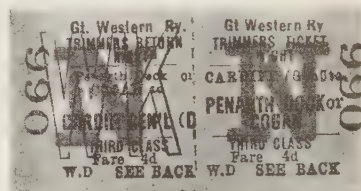


Fig. 910. — Trimmer's return ticket — Great Western Ry. — Overprinted with « N » (night) in heavy type and « WK » in skeleton letters for « workman ».

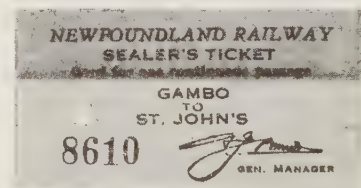


Fig. 911. — Sealer's ticket — Newfoundland Ry. — With fac-simile of General Manager's signature.

(1) At Chesterfield, packets of 50 tickets for 2/6 d.

(2) « Trade pupil's tickets » of the Connecticut Co. In New South Wales these are free.

GRANDS RÉSEAUX ET CEINTURES

N° **NORD 27000** 3^e CLASSE

Permis spécial de circulation pour Propriétaires.
Expéditeurs de bestiaux et Toucheurs.
(Tarifs G. V. et P. V. 1-401).

COUPON D'ALLER

Valable pour le départ au plus tard le lendemain de la date
de remise de l'expédition au surplusendemain dans certains cas (1).

M. (2) du
Appartenant à
et titulaire du permis n°
est autorisé à circuler gratuitement en 3^e Classe
pour surveiller et accompagner les animaux
N°
Nombre de chiens
N° (ou)
N° date de la gare de départ le chef de gare

Sous peine de nullité, ce permis doit être timbré par la gare initiale
de départ.

Notes : (1) Utilitaire à droit de franchise habituelle de 30 kilom. (à l'usage
aussi du transport gratuit de ses chiens jusqu'à concurrence de deux).
(2) Voir les conditions détaillées imprimées au verso.
(3) Nom du propriétaire des animaux.
(4) Nom de la personne accompagnant la gare destinataire.
(5) Propriétaire, toucheur, selon locaux.
(6) Points entre lesquels la gratuité
(7) Nombre et nature des animaux.
est accordée.

Voir au verso.

In England « bulk travel » tickets (*fig.*

304) have taken their place. Those who cannot return the same night then use :

Overnight commercial travellers tickets ⁽¹⁾.

Special tickets have also been issued for certain other commercial categories :

Dealer's ticket (formerly in Ireland);
Mercantile (fig. 902);
Market tickets.

The latter are in use nearly everywhere, even on light railways, tramways and 'bus services.

2. 6. — Special tickets for those following a manual trade. — Obviously workers' tickets are the most widely used (« workmen » or « workwomen » in England, « workers » in New Zealand, « workingmen » in America). In addition to seasons and multi-journey tickets, special tickets of various sorts are issued, which are only available at certain hours of the day. In England alone, for example, there are the following Edmondson tickets :

Workmen;
Workmen (morning);
Workmen (middle shift) ⁽¹⁾;
Workmen (late) ⁽²⁾;
Workmen (night series);
Workmen (overnight).

There are also, especially in English-speaking countries, special tickets for certain trades :

Hop picker (fig. 908);

Harvestman, harvestwoman, or again harvester (fig. 909) ⁽³⁾;
Reaper ⁽⁴⁾;
Market gardener;
Orange seller;
Onion seller.

and certain trades connected with the sea :

Fishworker ⁽⁵⁾;
Fisherman ⁽⁶⁾;
Sealer ⁽⁷⁾;

as well as other callings :

Quarryman, in Wales;
Munition worker;
Miner, in Amerika and Wales.

To these must be added various special tickets for those accompanying certain traffics :

Fruit messenger, in the United States ⁽⁸⁾;
Banana messenger, in the United States ⁽⁹⁾;
Cattleman (fig. 912);
Caretaker accompanying livestock;
Drover's ticket, in England;
Stock shipper's or owner's tickets, in the United States;
Trimmer (fig. 910).

Special tickets are also issued for various categories of employees or servants :

Representatives of agencies;
Servants, in India;
Attendants, pleasure parties;
Golf caddie;
Groom in charge of race horses;
Caretaker ⁽¹⁰⁾;
Household removal, in England (fig. 913).

⁽¹⁾ London North Eastern Ry.

⁽²⁾ Southern Ry.

⁽³⁾ Londonderry and Lough Swilly Ry., Ireland.

⁽⁴⁾ North British Ry., Scotland.

⁽⁵⁾ London Midland and Scottish Ry., London North Eastern Ry.

⁽⁶⁾ On the Scottish Companies as well as on the North Staffordshire Ry.

⁽⁷⁾ Newfoundland Gort. Ry.

⁽⁸⁾ Often as booklets of 25 coupons (Col. and Sn. Ry.).

⁽⁹⁾ St. Louis and San Francisco Ry.

⁽¹⁰⁾ Southern Pacific.

There are special tickets for apprentices on both railways and tramways ⁽¹⁾.

Road Transport merely issues special tickets for « workmen » (*fig. 186*).

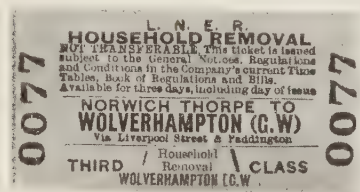


Fig. 913. — Edmondson ticket for household removal — *L. N. E. R.* (Red. 4/5).

2. 7. — Company's employees. — In addition to being entitled to a certain number of journeys free, they are issued special tickets at reduced rates both for themselves and their families, as :

- Employees;
- Relations of employees (*fig. 914*);
- Privilege tickets on the British Railways and overseas;
- Local privilege tickets, for railway employees;
- Through privilege tickets, for mixed journeys;
- Foreign privilege tickets, for other Companies' employees;
- Interchange privilege tickets for other Companies;
- Colonial privilege tickets, for employees of colonial railways;
- Child privilege ticket, for children of employees.

Tickets for the wives or daughters of employees are surcharged with a large W (Woman) ⁽²⁾ or have a half-moon clipped out of the upper side ⁽³⁾. There does not seem to be any very good reason for having so many different kinds of tickets for employees — according to whether

it is a question of this or that railway — unless the reduction granted varies in consequence.

Employees are also issued variations of other categories of tickets mentioned elsewhere, for example :

- Special excursions for employees;
- Week-end tickets for employees;
- Seasonal employees special round trip tickets, in the United States.

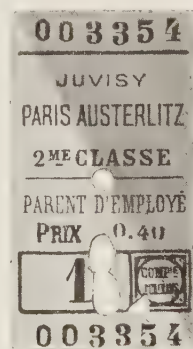


Fig. 914. — Ticket for relation of employee, issued at quarter price (and diagonally bicoloured in consequence) — *Paris-Orléans Ry.* (Red. 4/5).

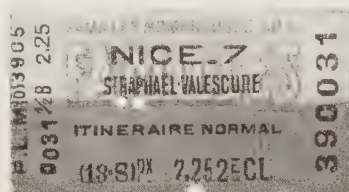


Fig. 915. — 50 % reduction ticket for members of large families — Bicoloured as are all French half-price tickets — *P. L. M. Ry.* — Route shown Printed in two colours : green and black — Ticket's number repeated at both ends and once arranged on two lines (Red. 4/5).

(1) *New South Wales Gort. Rys.*, issued at 3/4 of the usual fare.

(2) *Southern Ry.*, *Great Western Ry.*

(3) *L. M. S. Ry.*, *L. N. E. Ry.* and *L. P. T. B.*

(To be continued.)

British Railways' « Square Deal » Claims.

The problem and its solution.

In Great Britain, like in other countries, the Railway Companies are faced with serious difficulties, the chief cause being competition from other methods of transport which adversely affects the railways whose activity is fettered by statutory regulations.

The note we publish hereafter shows the original cause of the present position and its harmful effects, and states the steps the Railway Companies requested the Public Authorities to take in order to place all carriers on an equal footing, and to allow the railways to maintain their efficiency and thus go on contributing their full share to the economic life of the country.

For over 100 years the Railways in Britain have been under the strict control of Parliament in all matters affecting their methods of charging, publication of rates and conditions of carriage. It is relief from these restrictions, which through time have grown completely out-of-date, that the British Railways are asking in their claims for a « Square Deal ».

Briefly, their claims may be summed up under two headings :

1. The repeal of existing statutory regulations of the charges for the conveyance of merchandise, together with the requirements attached thereto, including such matters as classification, publication of rates and undue preference.

2. Like other forms of transport, the railways should be permitted to decide the charges and conditions for the conveyance of merchandise which they are required to carry.

In making these claims the Railways have stressed that when equality of conditions between all forms of transport has been achieved, it would be proper that any regulation which may in future be applied to any one form of transport should (in appropriate shape) be applied to all others.

The railways are handicapped by the fact that most of the controls of railway charges have been inherited from the le-

gislation of last century. Classification had its beginnings in the canal and turnpike charging methods; from the first it was applied to the railways, and since 1803 it has been very greatly elaborated. The obligation to publish rates goes back to the Regulation of Railways Act, 1873, under which it was made obligatory on railways to keep books available for public inspection at their stations showing all the rates and charges in operation. The obligation to give equality of treatment and to avoid undue preference was first laid down in 1845 and, as developed by the acts of 1854 and 1888, it is the law today. The only control which has not survived is the fixing of maximum charges. These charges, which date from the very beginning of railway legislation, were finally abandoned in 1921 in favour of variable standard charges.

In 1921 a far-reaching measure was passed which not only carried through the amalgamation of the various lines into the four great railway systems we know to-day, but abandoned the whole principle of maximum charges and substituted for it the principle of Standard Charges which are variable in relation to Standard Revenue. The main feature of the 1921 Act was the provision for the fixation by the Railway Rates Tribunal of standard charges at such a level as to

bring to the railways an annual net revenue (before remuneration of debenture capital) of approximately £ 50 000 000. This figure was based on the revenue earned in 1913, and minor adjustments are made from year to year for additional capital raised to meet additional capital expenditure. With such adjustments to 31st December, 1937, the yield would, if earned, be 4.7 per cent. of the capital receipts of the four companies. In no year since 1928 has the Standard Revenue been earned.

It was the broad intention of the 1921 Act that these standard charges should replace all existing classified rates and exceptional rates, but provision was made for the continuance of certain existing exceptional rates. Any new exceptional rate more than 40 per cent. below the standard charge requires the express approval of the Tribunal, and any new exceptional rate less than 40 per cent. below the standard charge must be reported to the Minister of Transport.

The system of charging on the basis of classification, though it is in many ways an admirable one, is clearly applicable only where the transport organisation operating it has a monopoly of all traffic. For its efficacy depends on preserving the balance between the goods which are carried at low rate, and those which bear larger shares of the overhead costs. As soon as this balance is disturbed the whole structure becomes, so to speak, bottom-heavy. This is precisely what has happened to British railways. The elaborate rate-structure which was developed during the nineteenth century was reaffirmed and extended by the 1921 Act, and was founded on the notion underlying all the railway legislation — the notion that the railways were a monopoly. Between the passing of the 1921 Act and the day when its rate-fixing sections

became operative, that conception ceased to be applicable to the actual facts.

Thus the 1921 Act perpetuated the restrictions based on the railways' monopoly position at precisely the moment when the monopoly began to disappear. Even in 1921, the fact that the railway monopoly would vanish in the next ten years could hardly have been foreseen. But the 1921 Act, by failing to foresee this development, defeated its own object.

The legislative system which the railways inherited from the nineteenth century has become an intolerable burden in the changed conditions of the twentieth, and particularly so during the past fifteen years. During the latter period the Railways have made various representations to the Government on their legal disabilities, and have repeatedly pressed for equal treatment with their road competitors.

In 1933, Parliament set up the Transport Advisory Council, to give advice to the Minister on transport questions generally, and in 1935 a Committee of the Council was appointed to investigate the subject of service and rates. Their report was submitted to the Minister in July, 1937. It recommended certain steps to be taken towards the creation of an orderly rates system for the road haulage industry. However, no practical advance has been made in this direction, and no steps have been taken by Parliament to implement the report.

The Railways therefore submitted, in a Memorandum dated November 23rd, 1938, that the existing statutory regulation of the charges for the conveyance of merchandise by railways, and the requirements attached to these regulations — such as classification, publication and undue preference — should be abolished. The Railways, exactly like other forms of transport, should be permitted

to decide the charges and conditions for the conveyance of merchandise. This would entail the repeal of Part III of the Railways Act, 1921, and also of various other Acts and sections of Acts.

The Railways further pointed out that they had no scheme in mind for embarking on an increase of rates, either in general or as affecting any particular industry; nor did they contemplate making wholesale reductions and plunging into a rate war with other forms of transport. Their charges would be known and available to their customers just like the price list of any large manufacturer or retail dealer, and would be varied in the same way as circumstances might demand.

The Minister transmitted the Railways' claim to the Transport Advisory Council as a matter for urgent consideration, and at the suggestion of the Chairman of this Council, the Railways entered into discussions on the subject of their claims with representatives of other forms of transport and various interests representing traders.

In a statement issued by the Transport Advisory Council on January 13th, 1939, the Railways amplified their proposals in certain directions, particularly from the point of view of safeguards for the protection of railway users. They proposed that there should be regular periodical meetings between the various trading associations and the railway companies for the discussion of railway rates and charges, trade prices and other matters of common interest.

If for any reason agreement on particular points was unattainable, there would be procedure for appeal to some such body as the Railway Rates Tribunal, which would have power to decide on the reasonableness of the charges under discussion. It would be open to any trader or body of traders to appeal to the Rail-

way Rates Tribunal against any charge fixed by the Railways.

The Railways seek no alteration in the law relating to their obligation to provide reasonable facilities, through rates, or standard conditions of carriage, or their obligations as common carriers, and have agreed to accept a suggestion made by the Council that any legislation which may be introduced should be limited in its application to five years.

Discussions between the Railways and representatives both of other forms of transport and of traders have been proceeding, and considerable progress has been made. A basis of agreement has been reached with the road transport representatives. The agreement includes a decision to set up a central consultative committee to arrange measures of co-ordination, and envisages agreements on rates for particular commodities or particular areas. It contains safeguards for the protection of trade and industry in the form of a right of objection to a judicial tribunal. The Railways' proposals will also help towards the ultimate aim of co-ordination of all forms of transport, because they clear the ground of all out-of-date restrictions which could not be applied to other forms of transport, and so will permit Parliament to deal with transport charges generally and equitably over the whole transport industry.

Quite apart from their importance as indispensable servants of the nation and of industry, the railways themselves have a right to be recognised as one of the nation's major industries. Directly, they employ about 600 000 men and women. An interesting feature of their labour system is that railway employment is generally regarded as secure. This position is officially recognised by the fact that at least 400 000 railway employees who would be affected are not brought

within the scope of the Unemployment Insurance Acts. The State is thereby relieved from the responsibility of providing for potential unemployment among this large group of workers.

The railways, moreover, are one of Britain's best customers. They buy annually 15 000 000 tons of coal, 14 400 000 cubic feet of timber, 250 000 tons of steel rails, 18 400 000 bricks, 9 000 tons of paint and varnish, and 2 350 000 yards of cloth. Thus the indirect employment they provide is considerable. The coal industry, in particular, is vitally concerned — for the railways consume 6 per cent. of the total output of saleable coal.

No feeling of security about their future can be entertained so long as the railways are prevented from meeting road competition in regard to goods traffic. The railways of Britain have maintained for over a century their efficiency and their self-supporting status. They have, until recent years, been able to bear reasonable interest charges as well as to develop and expand their services as the needs of industry have grown. All this expansion, absolutely necessary if Britain's chief industries are to have adequate and efficient service, must now stop. Not only this, but the decline in goods traffic has been so rapid and so disastrous for the railways that only immediate measures can prevent financial disaster.

It no year since 1928, when the rate-fixing sections of the Act became operative, has net revenue been anywhere near standard revenue; in fact, the aggregate shortage is now more than £ 172 000 000. The results for 1939 so far offer a no more cheerful prospect. In the first ten weeks in this year, receipts are already down by £ 1 672 000 compared with the corresponding period of 1938.

There is adequate evidence to show that it is due to the carriage of goods by road. Their competitors are able to skim the cream of the railways' most remunerative freight traffics — the higher classes of merchandise, and, of course, are able to conduct their business unhampered by anything resembling the restrictions which the railways have on their charges.

While business activity was 13 per cent. higher in 1937 and 6 per cent. higher in 1938 than in 1929, all classes of railway traffic had declined. Significantly, however, while passenger traffic declined by only 6 per cent. in each year, and coal traffic, where road competition is less serious, by 6 per cent. in 1937 and 10 per cent. in 1938, the receipts in the groups of freights most susceptible to road competition dropped by 14 per cent. in 1937 and by no less than 22 per cent. in 1938.

Up to the present, British Railways have been self-supporting. They have fulfilled the services demanded from them without any subvention or subsidy from the State, without assistance from the State in even a concealed form. Even the manner in which the Local Government Act of 1929 was applied to railways did not give them any relief, since it was limited by restrictions which were not imposed on any other industry.

Subsidisation by the taxpayer is not a remedy for the railway crisis. It is hardly, indeed, a palliative. For the basic problem — the inability of the railways, because of statutory restrictions, to meet competition on equal terms — is not affected by it. Until that problem is dealt with, the railway problem will remain intractable. The solution can only be one which will give the railways legal equality with their competitors.

New coaches for electric traction on the Netherlands Railways,

by E. BOLLEMAN KIJLSTRA, Engineer.

(From *De Ingenieur*.)

In 1935 the Netherlands Railways put eight articulated streamlined two-coach sets into service on the Rotterdam-Hook line. Their object was to obtain information as to the suitability of such stock for electric traction and, more especially, to ascertain the saving in energy consumption to be obtained, as compared with the corresponding consumption for existing stock.

It may be mentioned here that the length of the compartments is the same as that adopted for the diesel trains : in this way greater comfort is provided for the passengers.

The floor area per passenger is appreciably greater, and has been increased from 0.64 m² (6.9 sq. ft.) to 0.9 m² (9.7 sq. ft.) in the second class, and from 0.44 m² (4.7 sq. ft.) to 0.53 m² (5.7 sq. ft.) in the third class, as compared with existing stock.

If a comparison is to be made between consumption figures per passenger-mile, which is the standard method of computation adopted by the Railway Companies, we must not lose sight of the fact that the saving per unit of floor area is larger.

The energy consumption depends on the service conditions, i. e., on the running speed and frequency of stops, as well as on the way in which the trains are built.

An effort has been made to effect economies both by reduction of weight and by the adoption of roller bearings and streamlining. It is, of course, evident that the weight and the roller bearings

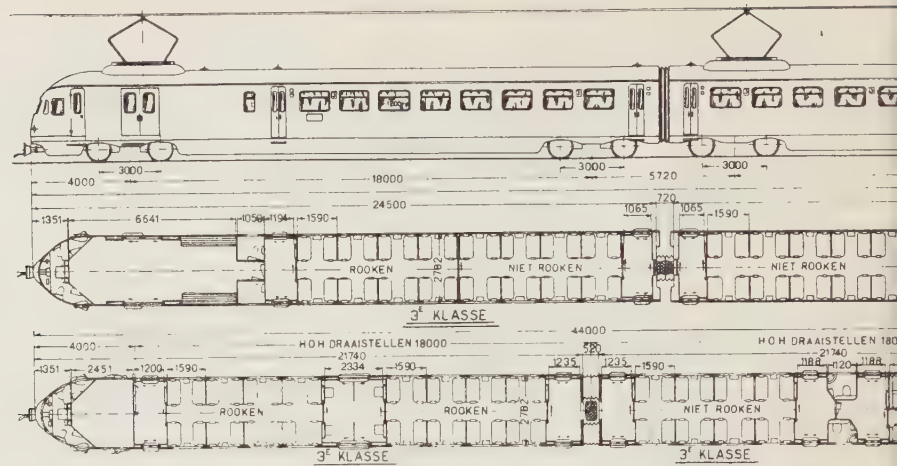
are of importance at starting, while at high speeds the effect of the streamlined shape is valuable.

A large number of measurements with comparable trains made up of old and new stock, with the same number of stops and same maximum speeds has enabled the overall effect of these three constructional factors to be determined; thus savings of 33 to 28 % per seat-mile have been recorded where stations were 10 to 25 km. (6.2 to 15.5 miles) apart, and with a maximum speed of 100 km. (62 miles) per hour. The savings arising from the adoption of streamlined forms will evidently be more appreciable at higher speeds.

The choice of the type of unit for future electrification schemes was finally influenced by both these considerations; to obtain the greatest possible flexibility in the make-up of the trains it was decided to order two-car and three-car units (figs. 1 and 2).

The two-car articulated unit is very similar to the Rotterdam-Hook stock : the three-car unit is made up of three separate coaches. This has enabled a gain of 10 m. (33 ft.) to be obtained in the train length, which gives greater capacity in consequence, but only at the cost of an increase in weight of approximately 660 to 750 kgr. (1 450 to 1 650 lb.) per passenger.

18 m. (59 ft.) has been adopted as the maximum distance between bogie centres : this is a limit which up to the present has only rarely been exceeded in Europe.



Figs. 1 and 2. —

Note : Rooken = smoking. — Niet rooken = non-smoking.

The three-coach unit forms a block which cannot be split up in service : the draw and buffing gear between coaches is non-automatic and is not of the usual pattern. On account of the greater coach lengths, there is a greater relative displacement of the ends on curves. For this reason the use of ordinary buffers was impracticable, and the latter has been combined with the drawgear.

In order to damp out any oscillations which might be set up between the vehicles, an arrangement has been adopted which has already been employed successfully by the Netherlands Railways. On account of the relative transverse movements between the bodies, however, the application of this arrangement to the three-car units appeared more complicated than in the case of the twin coaches, the two bodies of which rest on a common bogie (fig. 3).

In this way a rubbing movement is set up at the top and bottom of the coach ends, which favours steady running. At the top there is an arrangement of friction discs compressed by a spring to a load of about 1 000 kgr. (2 200 lb.).

To obtain the required lightness with ordinary 37 A steel, use has been made of Mannesmann drawn tubes of square section for the body framework, and welded beams of rectangular or round section for the underframe and certain body longitudes (fig. 4). The outside sheeting is of ample thickness : it is

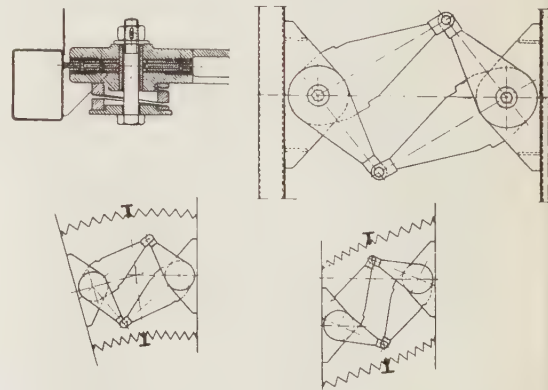
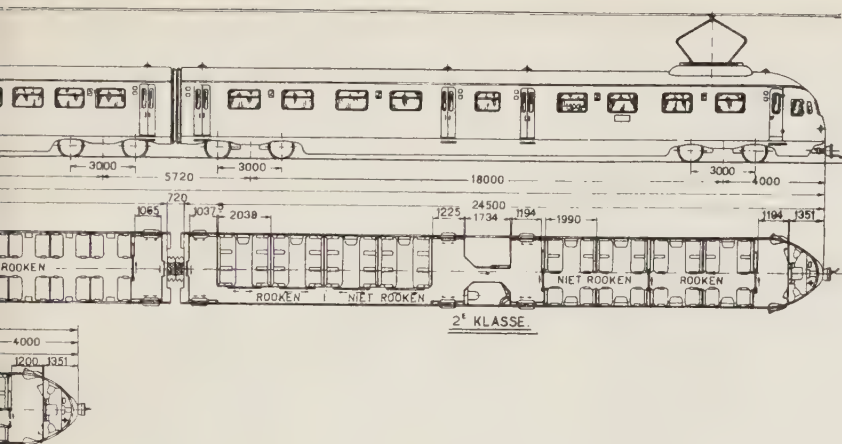


Fig. 3. — Coupling between the upper portions of the coach ends for limiting horizontal oscillations. The lower diagrams show the extreme positions.



car electric trains.

O. H. draaistellen = between bogies centres.

3 mm. (0.12 in.) thick on the side walls, and 2 mm. (0.078 in.) on the roof. The chief aim was to avoid the use of the costly methods of construction inseparable from the use of light alloys, and stainless or high-tensile steels.

In these circumstances, therefore, the body and bogies are constructed entirely of electrically welded 37A. steel. As is known, with structures subjected to alternate stresses, the advantages of St. 52 steel for welding operations are not particularly great, and it is as well not to under-estimate the difficulties which may occur with its use.

have led to the conclusion that where it is used in structures undergoing alternating stresses the advantages of this steel are not as great as was at first expected.

After all, the coaches now being put into service by the Netherlands Railways are not heavy. Obviously, there are always difficulties in making direct comparisons; however, the figures given in the table below may be taken as satisfactory, if it is remembered that the French trains are built of stainless steel of a tensile strength of 60 to 65 kg./mm² (41.3 Engl. tons per sq. in.) welded by the process known as « shot welding ».

—	Weight empty, metric (Engl.) tons.	Length, metres (feet).	Weight, kgr. per linear metre (lb. per linear foot).
Netherlands Rys' set	79 (77.7)	44 (144.3)	1 795 (3 960)
French State Rys' set.	66 (65)	39.2 (128.6)	1 690 (3 725)

It is of course well-known that St. 52 steel is used in coach construction abroad, but at the moment the tests carried out in this connection in Holland

In this connection it may be as well to mention further that the Netherlands Railways coaches have four traction motors, while the French coaches have six.

Both bodies and bogies are electrically welded, only best quality coated electrodes being used. As far as the method of construction is concerned the greatest possible freedom has been given to the builders, so as to enable each of them to follow his own working method. In this way the best equipped factory makes all the welds horizontally by using revolving jigs and moreover the bodies had to be made in such a way that vertical welds and welds in the top were kept down to a minimum.

All the welding work was strictly controlled. As might be expected, the welding operations carried out on such thin sheets still required very special attention being given to grinding and finishing, in order to obtain a pleasing external appearance.

The interior arrangements are very similar to those on the diesel units. In the second class coach of the three-coach unit the compartment design with side corridor has been re-introduced, as on the international-type coaches. It will be interesting to see which arrangement the public will prefer. Abroad, it would appear that there is a tendency to revert to separate compartments.

In addition, a small kitchen has been provided, equipped with a refrigerator, coffee machine, oven, water heater, etc.

The light-weight welded construction enables a greater vehicle length to be obtained with the same weight.

With increased length a greater reduction of width is necessary in order to avoid too great an encroachment on the loading gauge. It is therefore necessary to concentrate on reducing the thickness of the side walls as much as possible, which enables sufficient width to be obtained for the corridor and seating space. One method of achieving this is by the use of fixed windows, which allows a gain of 4 to 5 cm. (1 1/2 to 2 in.) in wall thickness.

To meet the frequently expressed desire for larger window openings, the up-



Fig. 4. — Section of body framework. (The small arrows indicate welded joints).

per part of the windows has been made to lift: this is effected by means of a handle fitted above the window. In order to obtain sufficient insulation, the lower window frames are made double: air which is as dry as possible is admitted into the 6 mm. (1/4 in.) intervening space. It remains to be seen whether, in our damp climate, this amount of insulation is sufficient.

Heating is effected by fresh air which is blown in from outside, electrically heated and introduced under the seats. It is expelled through roof extractors of standard pattern. Naturally, an hourly renewal of 15 to 20 times the total compartment volume requires a larger number of thermal units to heat the compartments than is generally the case.

From this viewpoint the arrangements used in America which allow of some of the expelled air to be used again are more economical. However, preference should be given to systems which enable the greatest amount of air renewal to be obtained.

On its way to the roof extractors the air passes over thermostats which switch the electric heater in or out. In this way automatic control is obtained.

In summer, fresh, unheated air is blown in by the same method.

Up to the present, complete air-conditioning has not been introduced on account of its high cost. The air which is drawn in is merely made dust free.

The width of entries and exits is

10 cm. (4 in.) greater than on the diesel trains, and the vestibules are more roomy. Illuminated signs « In » and « Uit » (Out) enable passengers to distinguish the entrance and exit vestibules from outside. Passengers have to alight from the vestibule forward of each compartment.

It has been possible to increase the width of the doors in the ends of each train : in the long sides it has been necessary to provide sliding doors, so as to dispense with hinged doors, on account of the streamlined shape.

Pneumatic control of the doors has not been resorted to for the time being.

If quite a large amount of attention is being given in technical publications to the construction of coach bogies, this is undoubtedly because for several years efforts have everywhere been made to improve their design. The steady increase in running speeds has naturally had a great deal to do with it, and rolling stock suitable for 90 to 100 km. (56 to 62 miles) per hour is often no longer so at higher speeds. Moreover,



Fig. 5. — Motor bogie.

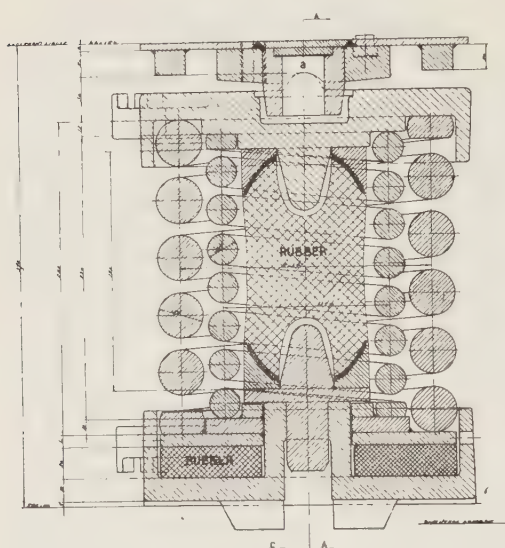


Fig. 6. — Spring assembly with shock absorber.

weight reduction has still complicated the problem. It is not certain, therefore, whether the bogies used for this electric stock will still be suitable in a few years' time, or will be replaced by bogies with better running qualities.

The bogie shown in fig. 5 has been designed on the lines of a type which has been successfully employed for corridor coaches. It is of the well-known American pattern with a modification brought thereto in Sweden, in which the swan-necked equalising bar is replaced by a straight bar under the axleboxes. (For information regarding the bogies, see also the interesting report by Professor BAUMANN, and Reichsbahnoberrat F. JAEHN, presented at the 12th Railway Congress at Cairo in 1933. — *Bulletin of the Railway Congress*, December 1932, p. 2251).

Advantage has been taken of experience gained with the diesel trains to make various other improvements in this bogie; for example, in order to pre-

vent the vertical oscillations which appear at certain critical speeds, owing to the absence of friction in helical springs, a simple type of shock absorber formed of specially shaped rubber has been adopted. This simple solution of the problem is all that is needed. (Fig. 6).

Furthermore, in order to minimise as much as possible the transmission of rail joint shocks to the bogie frame via the axlebox, a hinged joint has been provided at « a ». A similar type of hinged joint is also under test in the bogie centre-bearing.

A damper spring, i. e., a lightly loaded spring provided with rubbing plates lined with friction material, stretched transversely to the coach between the upper bolster beam and the bogie frame prevents bolster oscillation from becoming too great or too sustained. In addition, as an experiment, approximately half of the pairs of wheels are provided with a cylindrical rolling surface, which certainly contributes considerably to the improvement of transverse movements.

The question as to whether this will result in increased wear is still under examination; however, it is to be presumed that the amount of wear will depend on the quality of the metal in the wheels and tyres.

The wheels are of the one-piece type, forged and rolled, so as to be free of the loose tyre troubles inseparable from motor vehicles.

Fig. 7 shows a diagram of the lateral disc brake employed.

In this type of brake, advantage is taken of the high co-efficient of friction between brake linings and steel, a co-efficient, moreover, which remains constant at service speeds and temperatures. In addition, the wear of the material is very small.

The advantage of this type of brake lies in the possibility of using a light construction with small brake cylinders and low air consumption.

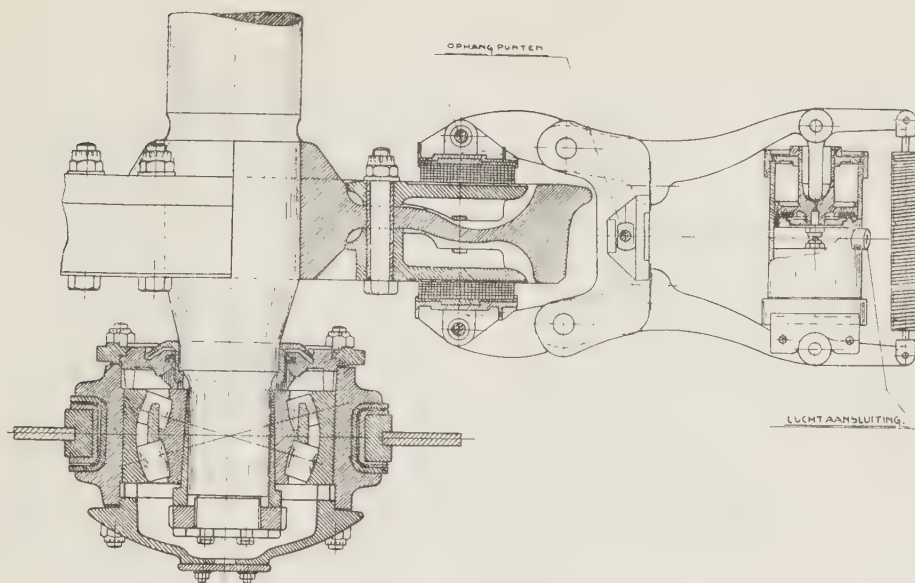


Fig. 7. — Section of wheel showing disc brake assembly and axlebox.

Note : Ophangpunten = suspension points. — Luchtaansluiting = air intake connection.

For regulating the air admission the Knorr-Lambertsen brake is used (see diagram, fig. 8). The compressors are of Westinghouse pattern. The brake is quick in response, will not leak off, and is capable of graduated release : it has proved its worth on the diesel trains. In anticipation of its being used on long 10-coach trains, the quick-acting position has been provided with contacts which operate an exhaust electro-valve giving rapid exhaust throughout the length of the train.

Here also the small brake indicator lamp which has been successfully employed on the diesel trains has been fitted. This lamp shows, in each driver's cabin, whether a handbrake has been applied anywhere in the train, or whether there is still some air pressure left in a brake cylinder, an arrangement which avoids the possibility of the driver starting up with the brakes on.

A section of an axlebox is also shown in fig. 7.

This axlebox is of the single race type, and has only minor points of difference from the standard pattern. In America this is the usual arrangement adopted. Its great advantage lies in the freedom of movement of the axlebox on the journal, which ensures that the former is not compelled to follow all the oblique movements of the wheel.

The motors are supported on the axles by sleeve-type suspension bearings of ample dimensions; the armature shafts run in roller bearings.

The rolling stock has been built entirely by Dutch firms, as follows :

53 articulated two-car units, by Werkspoor;

37 × 2 end-cars for three-car units, by Beynes;

37 centre cars for three-car units, by Allan.

The maximum speed obtainable is 140 km. (87 miles) per hour; the highest speed in normal service has been fixed at 125 km. (77 1/2 miles) per hour.

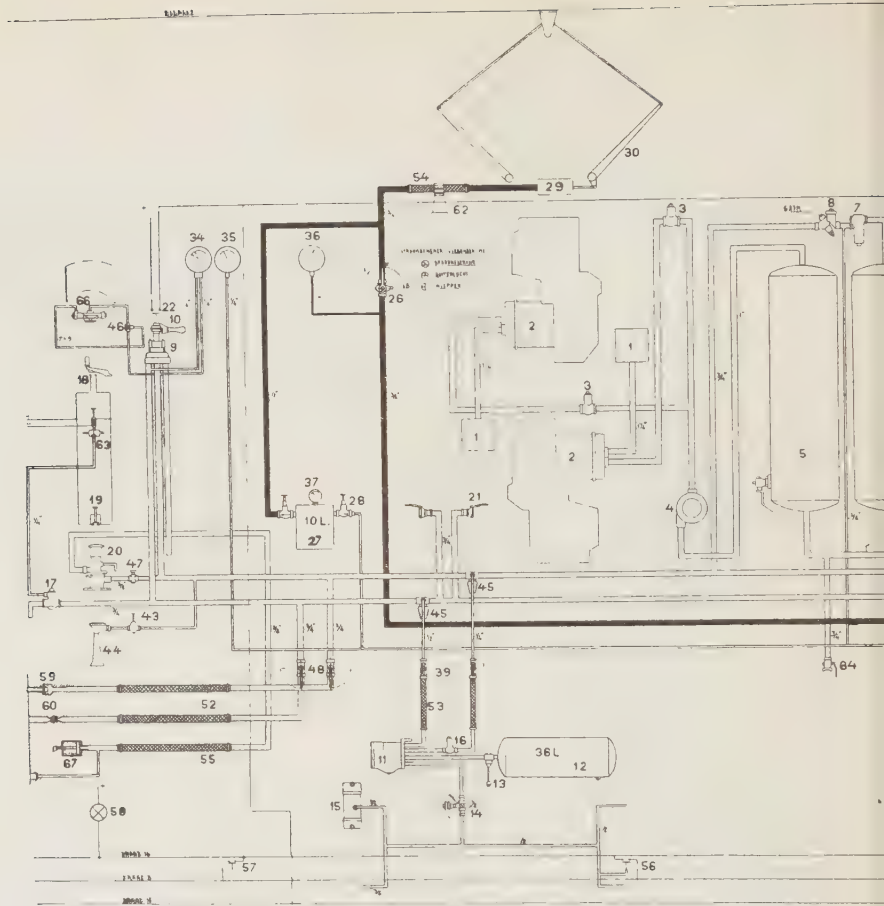
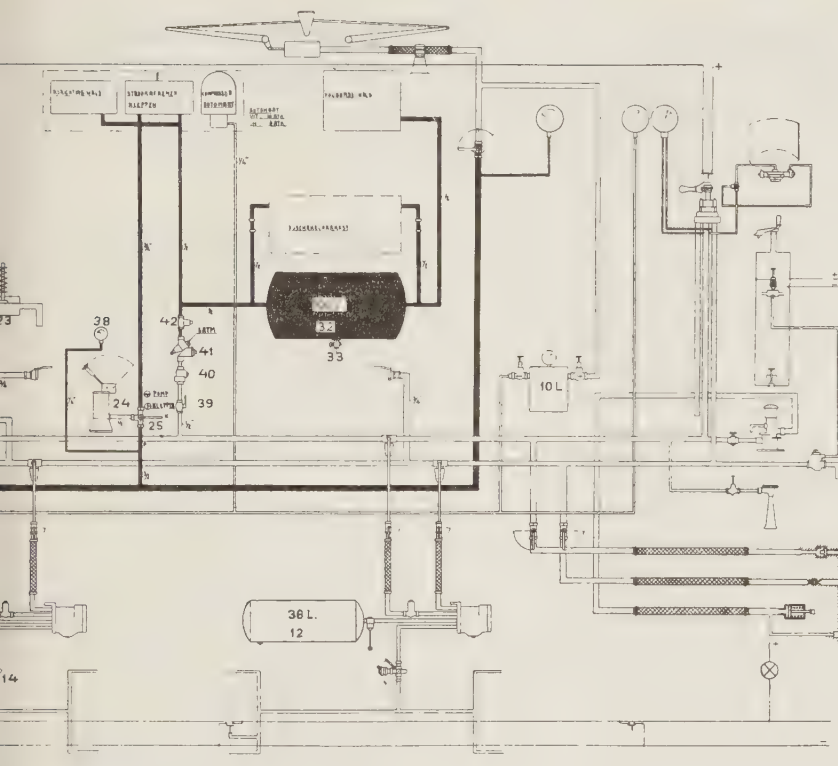


Fig. 8. — Diagram of p

Item No.	Quantity	DESCRIPTION.	Item No.	Quantity	DESCRIPTION.	Item No.	Quantity	
1	2	Compressor air strainer.	15	12	Brake cylinder (twin), B. 130/55/55.	29	2	Pant
2	2	Compressor.	16	3	1/2" Check valve, V. 9. B type.	30	2	Pant
3	2	Non-return valve.	17	2	3/4" Deadman's valve.	31	1	Air
4	1	Oil filter.	18	2	Deadman's handle.	32	1	Air
5	2	Main reservoir.	19	2	Deadman's pedal.	33	1	Dra
6	1	Safety valve.	20	2	Automatic coupler control pedal.	34	2	Dup
7	1	Air strainer.	21	4	3/4" emergency valve, A K 6 type.	35	2	Main
8	1	Reducing valve, R. 38 type.	22	2	Driver's brake valve contact for air release valve.	36	2	Pant
9	2	Driver's brake valve.	23	1	Air release valve, E. V. 59. L type.	37	2	Pant
10	2	Driver's brake valve handle.	24	1	Hand pump.	38	1	Har
11	3	Triple valve, F. 11 type.	25	1	3-way hand pump cock.	39	9	Isol
12	3	Auxiliary reservoir, 36-l. (2 200 cu. in.) capacity.	26	2	3-way pantograph cock.	40	2	1/2"
13	3	Release valve.	27	2	Pantograph air reservoir.	41	2	Red
14	3	G. P. cock (not installed).	28	4	Pantograph air reservoir isolating cock.	42	2	Che



er-Lambertsen » brake.

	Item No.	Quantity	DESCRIPTION.	Item No.	Quantity	DESCRIPTION.
Cylinder.	43	2	Horn operating button.	54	2	Pantograph connecting hose.
	44	2	Horn.	55	2	Automatic coupler connecting hose.
(in.) capacity.	45	6	Dust trap.	56	3	Air-brake contact.
(in.) capacity.	46	2	Window wiper isolating cock.	57	2	Hand-brake contact.
	47	2	Automatic coupler isolating cock.	58	2	Indicating lamp for brake contact.
driver's brake	48	8	3/4" isolating cock.	59	...	Automatic coupler check valve.
ge.	49	2	Coupling hose for main reservoir pipe and for train pipe, 800 mm. (2' 7 1/2") long, 12-36 mm. (15/32"-1 7/16") diam.	60	...	Automatic coupler isolating cock.
ge.	50	1	Pantograph supply coupling hose, 800 mm. (2' 7 1/2") long, 21-36 mm. (13/16"-1 7/16") diam.	61	6	Pipe line insulator.
	51	1	Coupling hose for pressure gauge pipe, 785 mm. (2' 7") long.	62	2	Insulating support.
	52	4	Automatic coupler connecting hose, 2,300 mm. (7' 6 9/16") long, 21-36 mm. diam.	63	2	Controller deadman's valve pilot valve.
	53	6	Bogie connecting hose, 1,000 mm. (3' 3 3/8") long, 16-38 mm. (5/8"-1 1/2") diam.	64	1	Connection with isolating cock for hose coupling.
				65	2	Main reservoir drain cock.
				66	2	Window wiper.
				67	2	Automatic coupler air cylinder.

Automatic apparatus for protecting level crossings, giving a constant warning interval independent of the speed of the train.

(*Le Génie Civil*, 15 October 1938).

Road traffic over railway level crossings has for a long time past been claiming the attention of public authorities and the railways, as well as, very naturally, the users of the highways. The question is becoming more and more pressing owing to the growth of motor traffic.

Few problems offer the technical experts such varied difficulties, little suspected by the public. The latter has for some time settled on the ideal solution, the total abolition of all level crossings. Until such a step can be realised, one which would affect more than 30 000 crossings in France and would cost hundreds of millions of francs — and circumstances are hardly favourable just now — rail and road will continue to cross each other on the one level for many years before they avoid each other on different levels.

This has been fully realised abroad and the fact must be equally well admitted in France. However, setting aside the rare cases where it is at present possible to eliminate the crossings, the reciprocal protection between rail and road at such places raises the problem of how to establish a method of working, equally acceptable to both, answering to the very different conditions proper to each, while ensuring their entire safety with the minimum of inconvenience.

In seeking for a solution of this problem, the first fact encountered is the question of the priority of rail or road. This indisputably belongs to the former,

because the sudden braking of a train travelling at high speed is, if not a dangerous, at least a delicate operation, while the driver of a road vehicle must, by the very terms of the Highway Code, always have his speed under control so as to be able to stop in a short distance.

Systems of protection.

To adopt one and the same solution everywhere, based on the same principle throughout, would be far too rigid. If barriers appear unnecessary at one crossing, it may seem advisable, or even essential, to install them at another; if fifteen or twenty seconds warning suffices at one place, a longer one may be needed at another. A wide field is thus opened to the investigation of engineers: serial or simultaneous operation of barriers or gates, in one or in partial movements, « parallel » or « scissors » fashion, on the spot or from a distance, and even the actuation of automatic stopping devices for bringing road vehicles or trains to a stop. The problem is extremely complex and made more so by the need of choosing the time when operation shall occur or warning be given (length of warning interval).

Methods of working traffic.

Railway traffic is regulated in a clear and precise manner and moreover is controlled by a suitable signalling system; carefully installed, maintained, and periodically inspected, this signalling is adapted to all speeds run or practicable on rails. In addition, a railway trains

its staff specially to handle traffic correctly and lays it down as fundamental to its rules that every railwayman, whatever his grade, must render unhesitating obedience to signals. This is the A B C of his profession. Even though the rail has not attained to perfect safety, it has at least taken considerable precautions.

Does the same apply to the road? As yet, no.

However the Highway Code has been adopted from necessity, and road traffic signalling is in the course of being adopted in the same way ⁽¹⁾. The highway is therefore being equipped, and will probably be so more and more, with suitable signalling, like the railway, rendering their methods of working more similar. The public will have to accustom itself to this, but to facilitate things, something simple, plainly understandable, and certain in action, is required.

Present principle of road signalling.

Hitherto, at least in France, with the devices usually employed, the setting in action of a signalling system at a level crossing for giving warning that a train is approaching, has been effected at a certain *definite point* on the track; to avoid *any delay* this point has been selected at such a distance in rear of the crossing that the warning interval is fully sufficient for ensuring safety to road users with the *fastest* train. This procedure undeniably results in the warning being given *too soon* in the case of *slow trains*, giving the road user faulty information and causing him loss of time.

For example, if a « protective warning interval of 20 seconds » is decided on for a level crossing on a line traversed by

railcars travelling at 150 km. (93 miles) per hour, the starting device must be installed about 800 m. (875 yards) from it; the consequence is that a goods train travelling at 15 km. (9.3 miles) per hour is announced more than *three minutes* before its arrival at the crossing. This time warning is excessive and even dangerous, because the road user, soon realising this defect, considers it no fault to go on the crossing in defiance of the warning if he is kept waiting a little longer than usual.

Rational principle of crossing protection.

It is therefore easy to see why the attempt to discover a rational solution to the problem, of general application, should have attracted the attention of technical experts. The S. P. I. [Société Parisienne pour l'Industrie des Chemins de fer et des Tramways électriques, 77, Boulevard Haussmann, Paris (8^e)] has designed one, and, after conclusive preliminary trials, is in a position to offer it to the railways. Having in mind the disadvantages of the *constant distance* method, it has directed its investigations to the use of a system operating under a *constant time interval*.

With such a system both the public and railway staff can be certain that, whatever the speed of a train, warning of its approach is invariably given at any particular crossing a given number of seconds before it reaches it. If the crossing has barriers or gates, the keeper is then in position to close them or keep them closed, thus reducing to the minimum the delay to the road user, who, being properly informed as to the condition of affairs, will no longer tend to get impatient.

The management will also be able, if it judges it advisable, to make the operation of the barriers, or any other device it thinks useful, dependent on a constant time interval device, in addition to the road traffic signalling, and

(1) The streets of large cities offer an excellent example of this; not only has the street traffic its own signalling, but recently even automatic signalling, a striking analogy with the rail.

while selecting the length of the « approach warning time ». If there are no barriers, the public will soon learn by experience that the appearance of the road signal indication means « instant danger »; people will no longer be tempted to cross the line when everything tells them that *a train is on the point of arriving (not several minutes off)*; they will soon be educated up to the facts.

The S. P. I. *constant time* equipment, which acts totally independently of the speed of the train and of the existence or not of any material or effective means of protecting the crossing, lends itself to the most varied combinations, such as the actuation of mechanical devices, lights, electric or acoustic appliances, selection of the length of the « warning interval », etc... It thus possesses the character of the general solution considered above.

**Essential characteristic of the S. P. I.
« constant time interval » system.**

In rear of the crossing concerned and at a distance fixed in relation to the maximum train speed and the *constant time interval selected for the warning by the management, to suit the public and the railway staff*, are fixed two inductors J_1 and J_2 (fig. 1). A third inductor J_3 is placed immediately beyond the crossing, for the purpose of freeing it when the last pair of wheels of the train has passed, and restoring the whole of the apparatus to the normal condition.

The motor M of the warning regulating mechanism is set in motion as soon as the front wheel of the train reaches the inductor J_1 . This motor, which has instantaneous starting and strictly constant speed features, rotates while the train is travelling from J_1 to J_2 , actuating a cam and putting a spring under tension.

As soon as the first wheel of the train reaches the inductor J_3 , the motor cir-

cuit is broken; the motor stops, but the spring put under tension unwinds itself and returns the mechanism to its original position at a speed also kept constant by a step-by-step locking and releasing device. The ratio n of the rate of winding up the spring to that of unwinding it can be selected at will, but is always a constant for a particular set of equipment.

Choosing the distances a from J_1 to J_2 and b from J_2 to the level crossing, so that $\frac{a}{b} = \frac{1}{n}$ ensures that the spring will arrive at the end of its stroke at the instant when the train reaches the crossing.

The distance a is travelled in an interval of time varying with the speed of the train. When the first wheel of the train passes onto J_1 , the regulating mechanism through the cam of its motor closes a contact M_1 (figs. 2 and 7) setting the equipment ready to work — and does so at the end of a time interval T_0 , *invariable* from the very construction of the mechanism, and hence independent of the speed of the train. The apparatus separates in this way the variable time interval which the train takes to cover the distance a into two intervals, namely: — the constant interval T_0 up to the moment of closing the contact M_1 and the variable interval t from that instant until the first wheel reaches J_2 .

As the regulating apparatus works in such a manner that the same division of the time occurs as the spring unwinds, *but in the reverse order*, while the train runs from J_2 to the level crossing, the final result is that the variable time taken to traverse distance b (fig. 3) includes:

— first, a variable interval nt , varying as the speed of the train, at the end of which the contact M_1 , previously set, starts the warning apparatus protecting the road traffic;

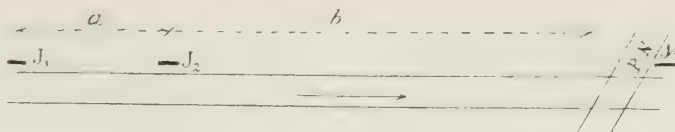


FIG. 1

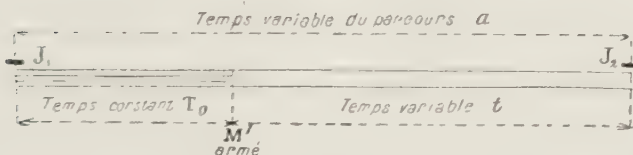


FIG. 2.

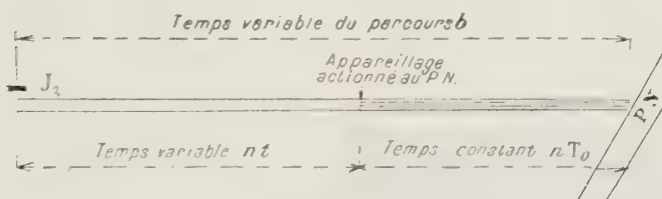


FIG. 3

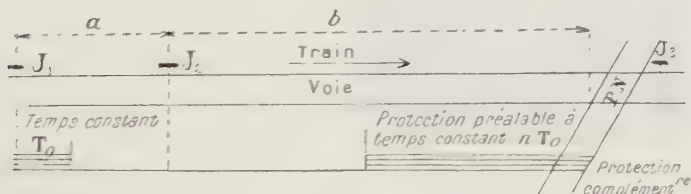


FIG. 4.

Figs. 1 to 4.

Explanation of French terms (in figs. 1 to 4) :

Appareillage actionné au P. N. = apparatus at level crossings set in action. — P. N. = level crossing. — Protection complémentaire = additional protection. — Protection préalable à temps constant nT_0 = constant warning interval of time nT_0 . — Temps constant = constant time interval. — Temps variable = variable time interval. — Temps variable du parcours (a ou b) = variable time interval for the distance a (or b). — Voie = track.

— secondly, a constant time interval nT , independent of the train speed, preceding the arrival of the train at the crossing, during which the protection of the latter remains effective; this protection lasts until, as above stated, the last wheel passes over J_2 .

Figure 4 represents these successive operations diagrammatically; it shows clearly the constant time interval nT_0

of preliminary protection while the train is approaching the crossing. Protection while it is passing over it depends on the length and speed of the train, acting on J_2 by its last wheel.

Such are the essential characteristics of the S. P. I. system, which, it may be added, requires no source of current on the track. As it does not include any insulated rail, it avoids all disturbance

of signalling track circuits and is not subject to the difficulties sometimes encountered in the use of track circuits of short length. It thus affords full security against variations in atmospheric conditions.

Detailed explanation of the system.

The inductors J_1 , J_2 , and J_3 are fixed between the sleepers (fig. 5). A wheel flange, passing through the air gap of an inductor, by varying the reluctance, induces an impulse of current in its winding: this is used to actuate impulsion type relays, R_1 , R_2 and R_3 (fig. 6), connected to the inductors J_1 , J_2 and J_3 respectively.



Fig. 5. — View of apparatus on the track.
J, inductor. — R, cover over cable junction box.

The relay R_1 on which the inductor J_1 acts closes through a relay A, the feed circuit to the motor M which, as already explained, starts at once and turns at a strictly constant speed. Its spindle, acting through gearing, actuates a cam and puts a spring under tension.

Whatever be the speed of the train, the cam, after having turned through a fixed angle α (fig. 7), corresponding to a fixed time interval T_0 , closes the contact M_1 . The motor continues revolving through a variable angle β during a variable time interval t , at the end of which the first wheel reaches the inductor J_2 . At this moment, therefore, relay R_2 receives an impulse and,

through the action of relay B, the motor feed circuit is broken.

Thus, between the closing and opening of the motor feed, a total time interval $T_0 + t$ has elapsed during which:

1. The cam, actuated by the motor, has turned through an angle $\gamma = \alpha + \beta$;

α is a constant of the apparatus and corresponds to the amount of rotation at constant speed of the cam during the constant interval T_0 ;

β is a variable angle, the greater the slower the train speed, corresponding to the amount of rotation at constant speed of the cam during the variable time interval t .

2. The spring has been put under tension to an amount proportional to the angle γ , that is to say, accordingly as the distance a between J_1 and J_2 has been covered at a higher or lower speed, or, in other words, accordingly as the motor has rotated for a longer or shorter time.

As soon as the motor circuit is opened, its shaft, under the action of the spring, begins to revolve in the opposite direction. By means of a step by step locking and releasing device D, released at the moment the motor circuit is opened, the return of the cam to the dead point position is made to occur within an interval n times that of the time taken in putting the spring under tension, n being a constant of the apparatus.

The track inductors are so installed that if a be the distance between J_1 and J_2 , and b that between J_2 and the crossing, we have: $\frac{a}{b} = \frac{1}{n}$.

Let v be the speed of the train, assumed to be constant during the run from J_1 to the crossing. The distance a between J_1 and J_2 may be divided into two portions x and y in such a manner that:

$x = vT_0$ = distance covered by the train during rotation through angle α ;

$y = vt =$ distance covered by the train during rotation through angle β .

As the spring unwinds :

While the cam is returning through the angle β the distance covered is ny . At this instant contact M_1 is opened, and, through relay C, the warning signal apparatus at the crossing is set in action.

While the cam is turning in the reverse direction through the angle α , the train covers the distance nx .

Now, $nx = nv T_0 = vT$, with $T = nT_0$.

T is thus seen to be the time taken to cover the distance nx , that is T is the warning time interval.

It is clear that this warning time in-

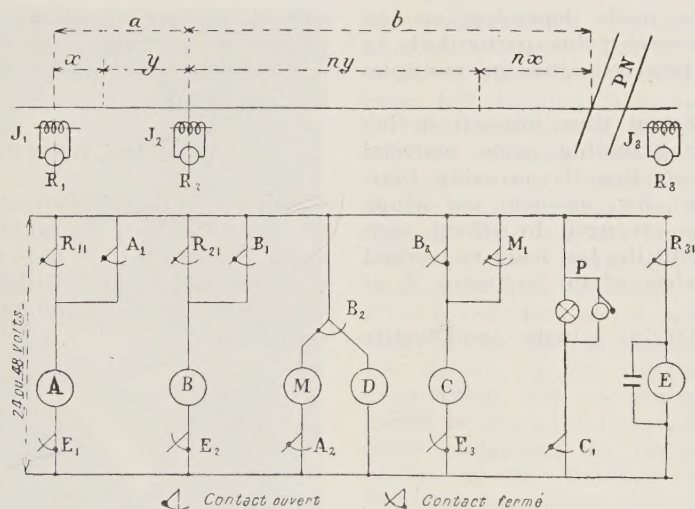


Fig. 6. — Diagram of S. P. I. level crossing warning system when the system is in a condition ready to work.

The contacts actuated by a particular device are indicated by its reference letter and index number. For example, the contacts on relays R_1 , R_2 , R_3 are marked R_{11} , R_{21} , R_{31} . Those on relay E, are marked E_1 , E_2 , E_3 .

Note. — Contact ouvert (fermé) = contact broken (closed).

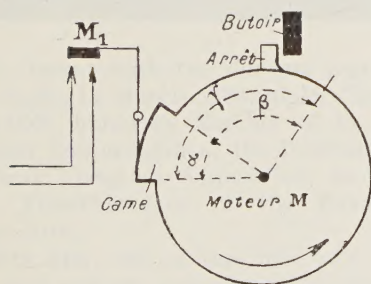


Fig. 7.

Note. — Came = cam. — Moteur = motor. — Butoir = fixed stop. — Arrêt = moving stop.

terval T is independent of the train speed; it is, in fact, the product of two constants of the apparatus, T_0 and n , and hence is itself constant.

The problem is completely solved if the warning time interval desired and the maximum and minimum train speeds on the line are agreed upon.

When the train reaches inductor J_3 , situated immediately beyond the crossing, the relay E is energised, but a condenser, shunted across it, keeps its armature attracted during the intervals between pairs of wheels. As soon as the

last one has passed, clearing the crossing, relay R_3 finally opens its contact and relay E returns to normal after the condenser has discharged.

By means of this relay, the warning signal at the crossing is kept in action until the last wheel has gone by; then only does the protecting apparatus return to the normal position.

This resetting to normal may in certain cases be made dependent on the passage of several trains, particularly in the case of level crossings on multiple-track lines.

If the constant time interval device is used for actuating some material means of protecting the crossing (barriers or gates, for instance) the whole equipment is arranged to afford such protection until the last train concerned has passed clear of the inductors J_3 at the crossing.

If the apparatus actuates road traffic

lights, it is advisable to avoid all chances of a mistake on the part of the road users who, seeing the red lights still showing after one train has passed (while another, the approach of which they are not expecting, is coming), might imagine that the lights were continuing to show through some defect and think themselves authorised to pass over the crossing at the wrong time. In such a case the system includes a supplementary warning device, formed by one or more illuminated signs bearing the inscription :

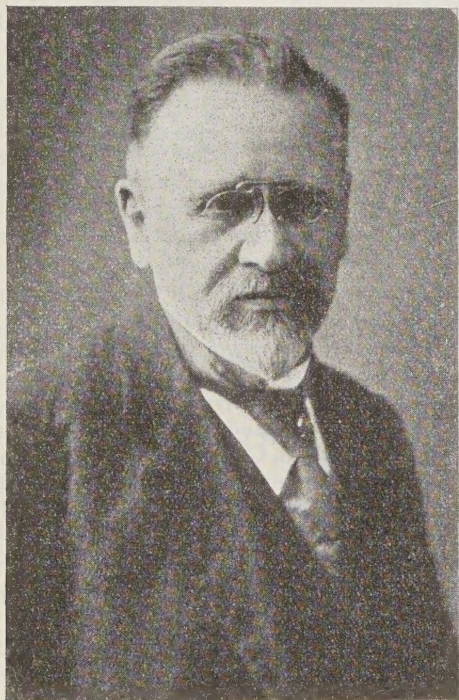
REMAIN WAITING

which light up automatically by means of a relay suitably connected in the circuits. This condition lasts until the last train for which the warning is showing has passed clear of inductor J_3 on its own line.

OBITUARY.

Clément COLSON,

Honorary Vice-President of the French Council of State, Member of the « Institut de France »,
Honorary Member and former Vice-President of the Permanent Commission
of the International Railway Congress Association.



now passed away. During many years he took an active part in the management of this Organisation; little was done, few decisions were come to without his intervention, and this often at his own initiative. He took a hand in the general organisation, the preparation of the sessions, in all the principal gatherings held on the occasion of the Congresses, and in the discussion of the most interesting questions. We have a vivid recollection of the brilliant part he took, at the Madrid Session (1930), in the debate on the question of road competition and the masterly way in which he made the Congress express the wish containing the essentials of the claims of the Railway Managements. That our Association set a high value on his collaboration will not surprise those who know his life, his work and the eminent place he held in his own country. M. COLSON, who was an engineer and a versed economist, was also an authority on matters of transport, public works, political economy and finance.

We heard with the deepest regret of the death, in March 1939, of M. Clément COLSON, honorary Member of the Permanent Commission of the International Railway Congress Association, and former Vice-President of the Executive Committee.

With him, one of the men who were the most actively connected with the life of the Railway Congress Association has

He was born at Versailles on November 13th, 1853. After studying at the « Lycées » of Metz, Lille and Paris (Saint-Louis), he entered the « Ecole Polytechnique ». As a civil engineer, he entered the Council of State where he spent his whole career. He was appointed « Maître des Requêtes » (reporter) in 1883, State Councillor in 1892, Chairman of the Financial Section in 1920, and finally Vice-President of the

Council of State in 1923, which post he held until he retired, in 1928. From 1894 to 1895, he was Director of the Railway Department at the Ministry of Public Works and during his tenure he exercised considerable influence over the High Administration and economic circles.

Besides being an official, M. COLSON was also a professor. He taught political economy at the « Ecole des Ponts et Chaussées », the « Ecole Libre des Sciences » and « Ecole Polytechnique ». His six-volume course on Political economy extended his reputation outside his own country. His work « Transports et Tarifs » had become classic. He published a number of other works which cannot be enumerated here. He contributed almost regularly from 1896 to the « Revue Politique et Parlementaire », a quarterly review on transport problems.

In 1910, M. COLSON was elected a member of the Academy of Moral and Political Science, in the political economy, statistics and finance section. He also had been President of the Society of Political Economy, Paris.

His participation in the work of our Association dates back to 1889, when he presented a report on Question XVIII — Railways and Waterways — to the Session held that same year. He took part in the St. Petersburg Session (1892), for which he drew up a report on Question XXXIX — « The Statute of Light Railways ».

M. COLSON was elected a member of the Permanent Commission in 1894. Besides his active participation in the Management of our Association, he was also a reporter at the Paris (1900) Session (Question XXXVII : Influence of light railways on the national wealth); at the Washington (1905) Session (Question XVIII : Direct financial co-operation of the State and localities interested in the development of light railways); at the Berne (1910) Congress, in collaboration with Mr. L. MARLIO (Question XII: Railways and waterways). He was the Chairman of the 4th Section — General — of that Session. He also attended the Rome (1922), London (1925), and Madrid (1930) Congresses, as Vice-President of these Sessions and Chief delegate of the French Government.

M. COLSON was elected Vice-President of the Permanent Commission in 1913. He relinquished this post in 1935, at the end of over forty years' co-operation to the activity of our Association. M. COLSON was then elected Honorary Member of the Permanent Commission as a token of the high esteem in which he was held by his colleagues, and in recognition of his untiring devotion to the work of the Association during his long career.

M. COLSON held the Grand Cross of the Legion of Honour.

We wish to convey our sincerest sympathy to his family.

The Executive Committee.